AMSTRAD COMPUTER USER

95p

August 1985



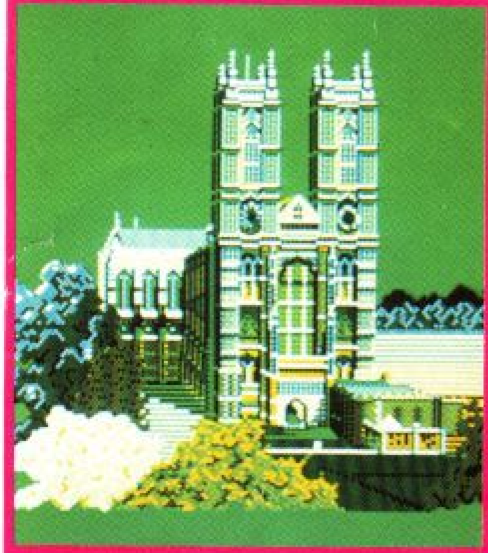
The Amstrad Gallery

Graphics Packages Reviewed

Amsoft vs CRL vs Kuma



Technician Ted Full Map Inside



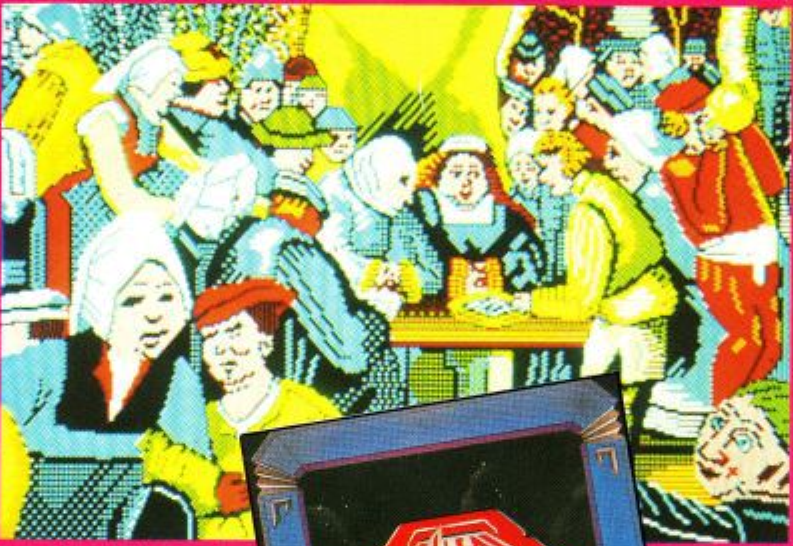






CPC6128 - First Report

Knight Lore in Detail





Making the Most of Music

Mozart from Machine Code

Alien 8 - Full Review



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Amstrad User is the OFFICIAL magazine for users of the Amstrad CPC464 and CPC664. It is published monthly, the next issue will be on sale from August 8th 1985. Back issues are available from Amsoft Mail Order at £1.20 each (including postage).

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REVIEWS

PROGRAMS

AMSTRAD COMPUTER USER

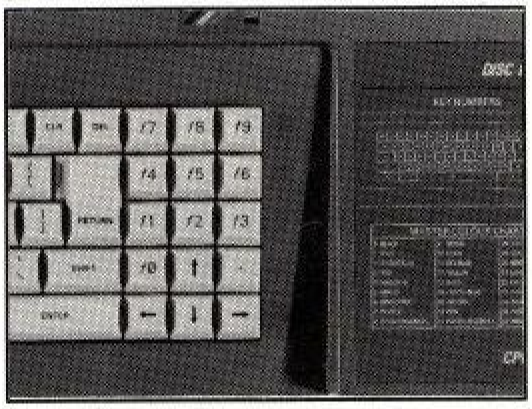
SOFT-5009 Issue 9 August 1985

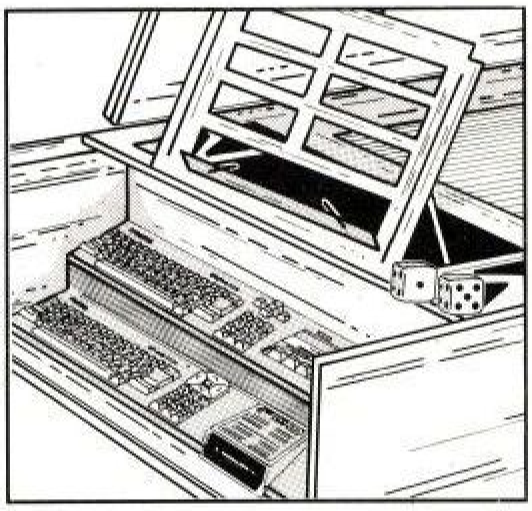
FEATURES

COMPETITIONS

NEXT ISSUE

Jet Set Willy *Map, Hints & Tips*
Amstrad's RS232 *Reviewed*
Software Competition *£2000 prize*
Super Power Rom Board *A closer look*



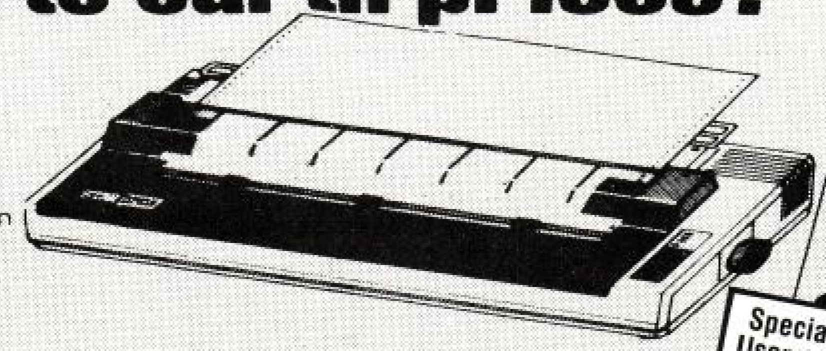






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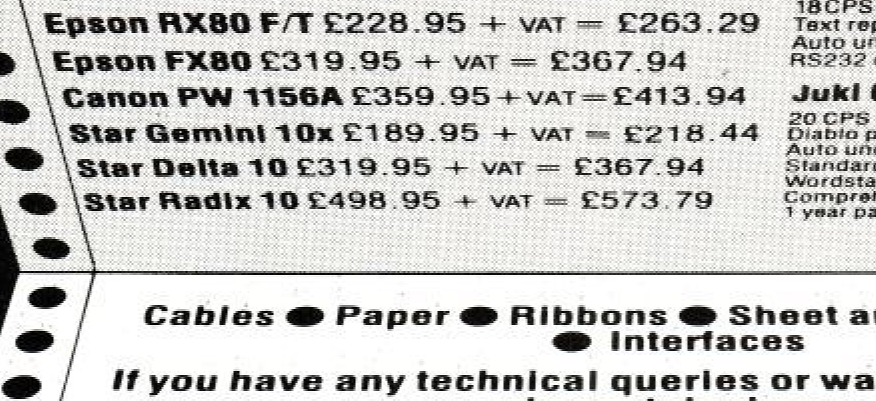
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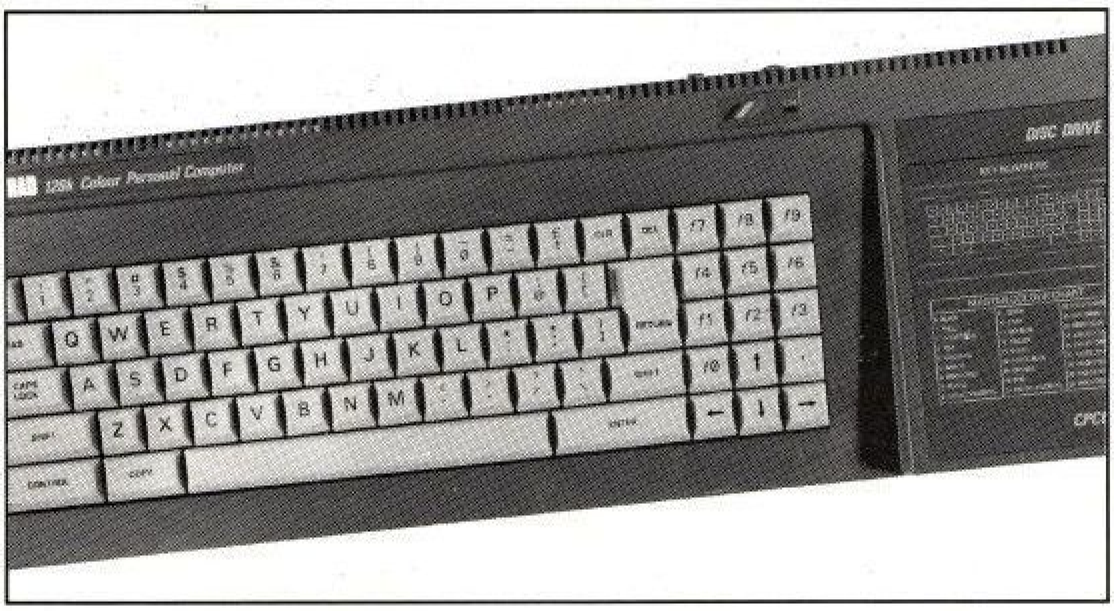
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User News...

New Amstrad Computer Launched in America.



Indescomp Inc. of Chicago are to be the first people to sell a new Amstrad computer. The CPC6128 will cost $799 for the colour version and $699 for a green screen system. Initially, the 6128 will only be sold in the USA, although it looks as though it will be sold in Europe early next year.

The CPC6128 is based on the '664 but has a host of new features. The most obvious difference is the new case. The monitor is the same as that used with the '664 but the keyboard unit is smaller, sleek and more business-like. Many of the keys have been moved and the overall height reduced.

The extra 64K RAM is bank switched and allows the computer to run CP/M+. This alleviates the problem of a small TPA (Transient Program Area) on the '664. CP/M+ has many advantages over standard CP/M. A set of utilities allows programmers to benefit from the extra RAM. The disc copying and formatting program is streets ahead of the standard copydisc utility. There is a program to aid Basic programmers who want to use the extra memory, called "Bank Manager", which provides a set of RSX's to allow you to simulate a RAM filing system or flip between screens.

The CPC6128 is the first Amstrad product to be sold in America, this has only been possible because of Indescomp's confidence in the machine and willingness to enter a market which is traditionally hostile to European computer manufacturers. Many deals have already been tied up to ensure distribution, sales and support for both hardware and software. One of the most important of these is a deal with Sears Roebuck & Company, a major high-street retailer. The CPC6128 is software compatible with the CPC664 and will run CP/M 2.2, which is included with the package. One nice addition to the Stateside set-up is the inclusion of three blank discs with each computer and the world famous 'WordStar' word processor for green screen users. With a colour system (color? - Ed) the users get the not quite as famous 'Amsword' word processor and a copy of 'Roland in Time'

Amstrad Computer User hopes to have a full review of this exciting new development in the near future. Watch this space!

The Lincs Home Computer Club

Readers in Lincolnshire may be interested in a club catering for users of all computers. You can get more details from the secretary - George Scott by writing to 124 Spalding Road, Pinchbeck, Spalding, LINCS, PE11 3UE. If you run or belong to a club then drop us a line and when we have enough we will put together a page of names and addresses.

Jet Set Willy Winners

We finally have the results of the Jet Set Willy Competition. These are the lucky winners: J Wilde of St Leonards-on-sea, J Donoghue of Glasgow, G Tate of South Shields, P Windsor of Newcastle Upon Tyne, F Struthen of West Lothian, P Rowland of Woking, E McGirr of Stafford, Mark Tinker of Leicester, H Harris of Trowbridge, G Jones of Pontypool, E A Clements of Glasgow, Stuart Aithison of London, C Minto of Kipper, H F Wallace of High Wycombe, J Gardner of Basildon, L Watson of North Humberside, R Taylor of Hampshire, C Smedley of Leicester, R Hancock of Lincolnshire, A Bell of Weston-super-Mare, D Wilson of Manchester, P Smith of Falkirk, J Saward of Braintree, P Edwards of Stevenage, C Faulkner of West Lothian, K Williams of Worcestershire, J Smith of Falmouth, S Solway of Sheffield, R McCrea of Co. Antrim, M Clunn of Stoke on Trent, D Cartwright of Lancashire, V Martin of Dudley, I Smith of Kelso, P Mellor of Swindon, N Hobday of Wolverhampton, P Harrison of Gwent, E Campbell of Wirral, L Giles of Chatham, S Fraser of Derby, P Barrett of Glasgow, Officer Wood of Peterhead, R Sutherland of Wokingham, H Hill of Swindon, S Ladd of Southend, L Coughtrey of Lancaster, E Taylor of London, R Urwin of Ilkeston, A Schilling of Didsbury, D Pilgrim of Suffolk, B Barrass of Bury St Edmonds, W Morton of Aldershot, J McCrory of Belfast, P Bickmore of Chichester, M Connell of West Lothian, R Wilcox of Winchester, R Davies of West Glamorgan, J Gent of Redcar, D Gaughan of Edinburgh, J Gallagher of Manchester, C Smith of Wiltshire, D Brooks of Enfield, F O'Hare, of Runcorn, H MacDonald of Walton on the Hill, S Jones of Birmingham, K Rether of Driffield, B Tarr of Plymouth, S Palmer of Norwich, S Hollway of Surrey, S Lee of Tamworth, N Marsh of Mansfield, M Clark of Warley, A Eardley of Walsall, J Butcher of Birmingham, F Prisley of Gillingham, N Walker of Abingdon, J Read of Oldham, M Davies of Cornwall, R Woodbridge of Basildon, D Harris of Shropshire, P Nichols of Dover, M Smith of Kingston upon Hull, P Eva of South Glamorgan, R Moore of London, C Payne of Banbury, P Atherton of Shrewsbury, J Stillwell of Guildford, P Davies of Huntingdon, N Grattidge of Swansea, M Pearce of Bristol, P Hillard of BFPO 17, R Miller of Chichester, S Marsh of Pitsea, A Richards of Swansea, P Murphy of Rochester, C Griffiths of Wantage, E Boyd of Tyne and Wear, D Millward of Great Yarmouth, D Meynell of Welling, D Gill of Selby.

We did not receive 100 correct entries we therefore chose the entries that we judged to be the nearest to the correct ones. Congratulations to all who won and thank you to everyone who entered.

OOPS!

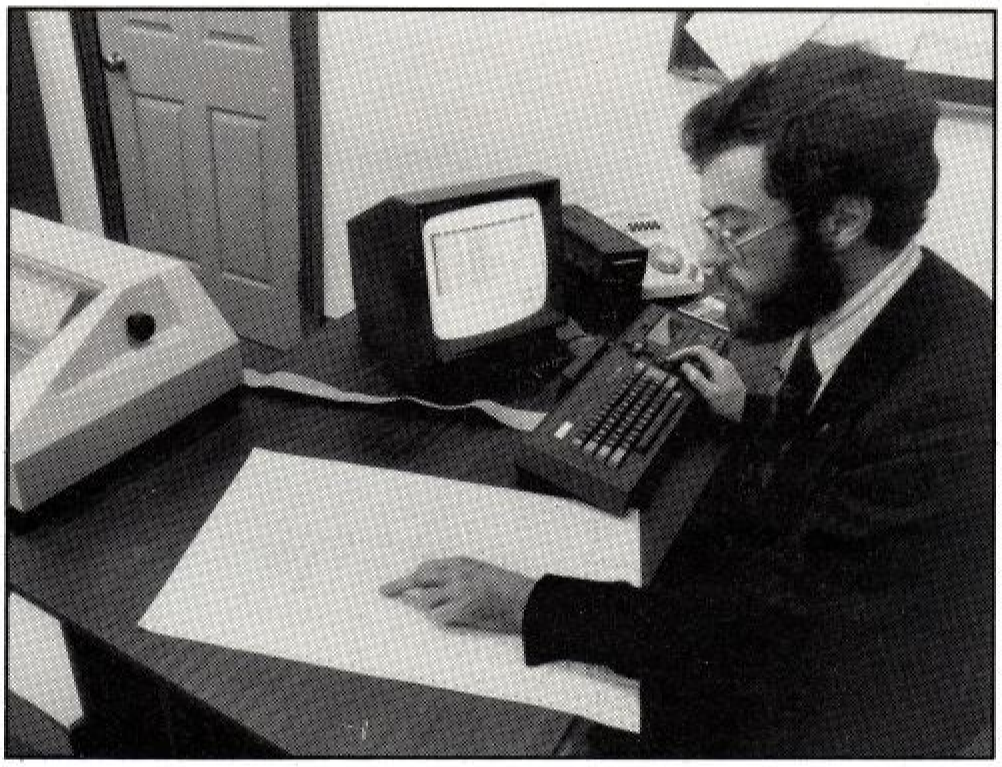
Head hung in shame we have to admit to a mistake in the July issue. These lines were missed from the 'Beat the clock' program.

```
4460 B$="BONUS"
4470 LOCATE 8,20:PRINT B$
4480 PEN 1
4490 FOR B=1 TO 15
4500 FOR BP=1 TO 5
4510 LOCATE 7+BP,20
4520 PEN 1:PRINT MID$(B$,BP,1)
4530 SOUND 1,BP*B,3,7,0,0,0
4540 FOR I=1 TO 50:NEXT
4550 LOCATE 7+BP,20
4560 PEN 2:PRINT MID$(B$,BP,1)
4570 NEXT:NEXT
4580 ORIGIN 320,280
4590 TAG
4600 FOR i=1 TO 5
4610 SOUND 1,500-PT(PL),3,7
4620 FOR d=1 TO 200:NEXT
4630 pt(pl)=pt(pl)+10
4640 MOVE (294-LEN(STR$(pt(pl)))*16),(pl
     *2)*10
4650 PRINT pt(pl);
4660 IF pt(pl)>trg THEN 5320
4670 NEXT
```

CPC664 Winner

Colin Hughes of Luton is the lucky winner of a shiny new Amstrad CPC664 from the competition in the May issue. We had well over 4,000 entries, most of them with the right answer of 385 for the total of the page numbers.

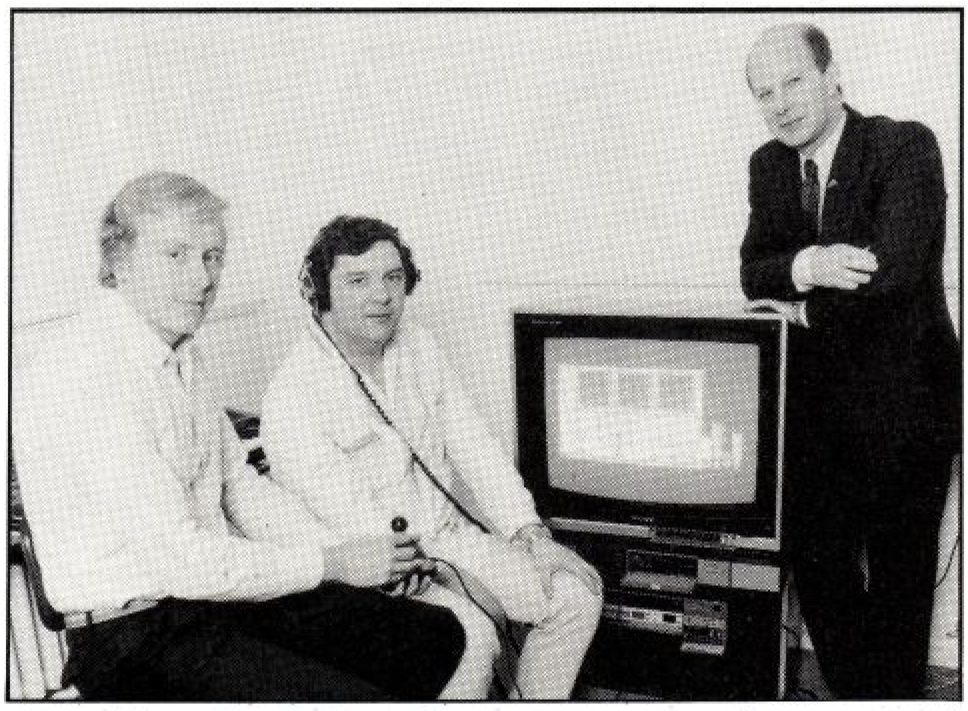
CPC464's Save Money



Format publicity, a small but busy consultancy in Godalming, Surrey, specialising in UK and European publicity have found how useful the CPC 464 can be. They wanted to install computers into their offices and contemplated many systems, including PC's and dedicated wordprocessors costing up to £6,500. Instead they settled on three CPC464's at a cost of £2,400.

The hero of the story is really the Tasword wordprocessor, which proved to be nicer to use than a package they had demonstrated on an Apricot. The company tried a selection of printers including an Anadex DP-9501 and a Brother HR-5.

The computers are not only used for wordprocessing, spreadsheets and accounting, as Format do admit to owning some games. The CPC's are very popular with the staff who like the keyboard and find the software powerful, without being confusing.



Ocean says Relax.

This summer will see the release of "Frankie Goes to Holywood" for the Amstrad micros. The tape will contain both audio and software tracks so that you can listen to a special, live, version of the band's famous single 'Relax'.

The aim of the game is to penetrate the 'Pleasuredome', this is achieved by scoring 'Pleasure units", earned by solving puzzles and negotiating a maze. (Sounds like a platforms game to me - Ed.)

When someone as major as 'Frankie' is involved every step has to be checked with the band. The photograph shows James Bradley of Island records, Tony Pope - the manager for 'Frankie' and David Ward - the Boss of Ocean checking the final mix.

Supercharge your memory

One of the really under-estimated features of the CPC464 is its ability to use up to 240 sideways ROMs. These are chips that you can plug in and will mind their own business until you want to use the programs they contain. Then with a simple RSX you can summon your game, wordprocessor, utilities or whatever you happen to have sitting there. To use sideways ROMs you need either custom hardware (like the Arnor MAXAM ROM) or a ROM board. The first such board to be offered is from Micro Power, each board holds up to 7 ROMs which can be either 8K or 16K. Extra boards can be added or a disc drive plugged into the back.

To start with, two ROMs will be available. The first is a disc user's utility ROM which allows editing of tracks and sectors, programmers toolkit commands, and a built in FORMAT and Verify.

The second ROM will be a Mailing List/Club Membership program. This kind of application is particularly suitable for a rom because it leaves more room for data.

The board and roms will each cost £39.95.

Kuma — the only choice

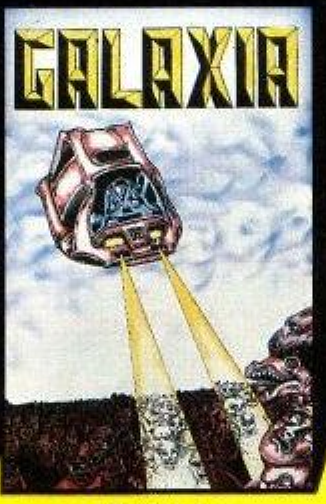
AMSTRAD CPC464 software

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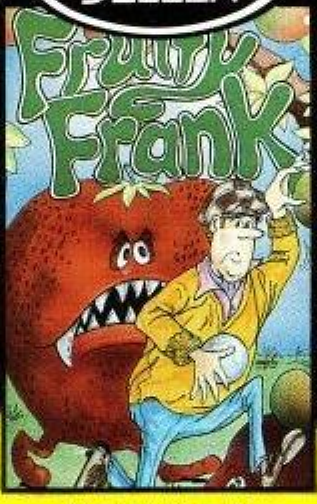


NEW

North Sea Bullion



Galaxia



Fruity Frank

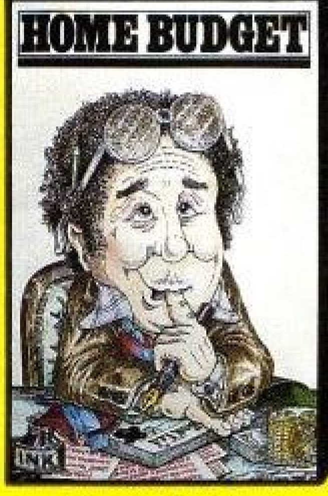


Star Avenger

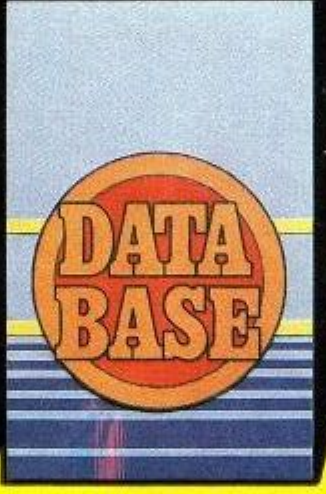


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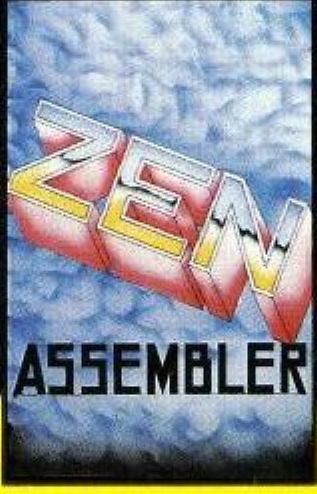
Shadow of the Bear



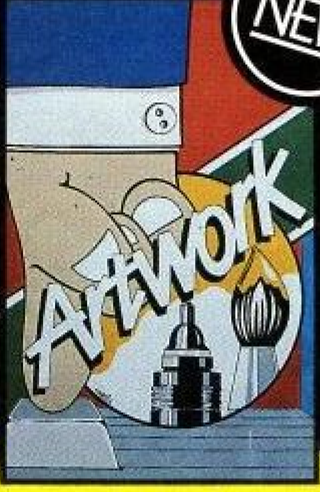
Home Budget



Database

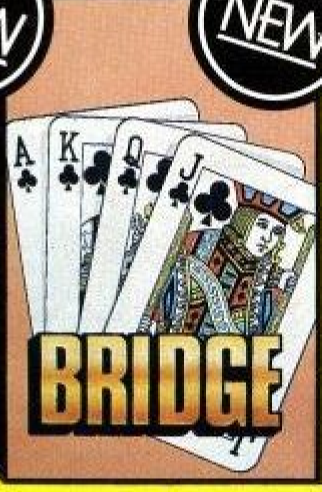


Zen Assembler



NEW

Artwork



NEW

Bridge

• BOOKS

No.1 BEST SELLER

The Amstrad CPC 464 Explored
by John Braga

This superb book is designed to let every CPC 464 user, at whatever level, get the most from his computer. After an introductory section on the special Basic features, the book looks in depth at the excellent sound and graphic facilities.

NEW

ZEN and the Amstrad CPC 464
by Ian R. Sinclair

This book covers the CPC 464 itself, a detailed guide to Zen, an introduction to the Z-80, ROM, and RAM, subroutines, screen and keyboard, cassette I/O and how to plan a program. The text is littered with illustrations, diagrams and helpful program examples.

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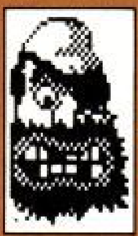


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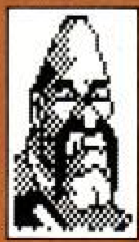
(THE CHALLENGER)



1 CANADIAN CRUSHER
CANADA
The big, plodding, lumber-jack from Canada, with the beauty of a grizzly bear and the speed of an elephant.



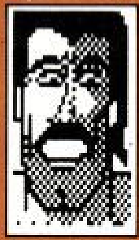
2 FLING LONG CHOP
JAPAN
All the way from the land of the rising Hi-Fi is Fling Long Chop, a martial arts master of No-Can-Do.



3 ANDRA PUNCHEREDOV
USSR
Andra is a fast, dancing Russian who goes to your head faster than a neat glass of Vodka.



4 TRIBAL TROUBLE
AFRICA
Tribal means trouble for anyone, he has a temper that gets the better of you! Landing the punches with unnerving accuracy.



5 FRENCHIE
FRANCE
Frenchie may appear to be cool, suave and sophisti-cated, but this deceptive façade hides a rather menacing individual, ready to make you see stars.



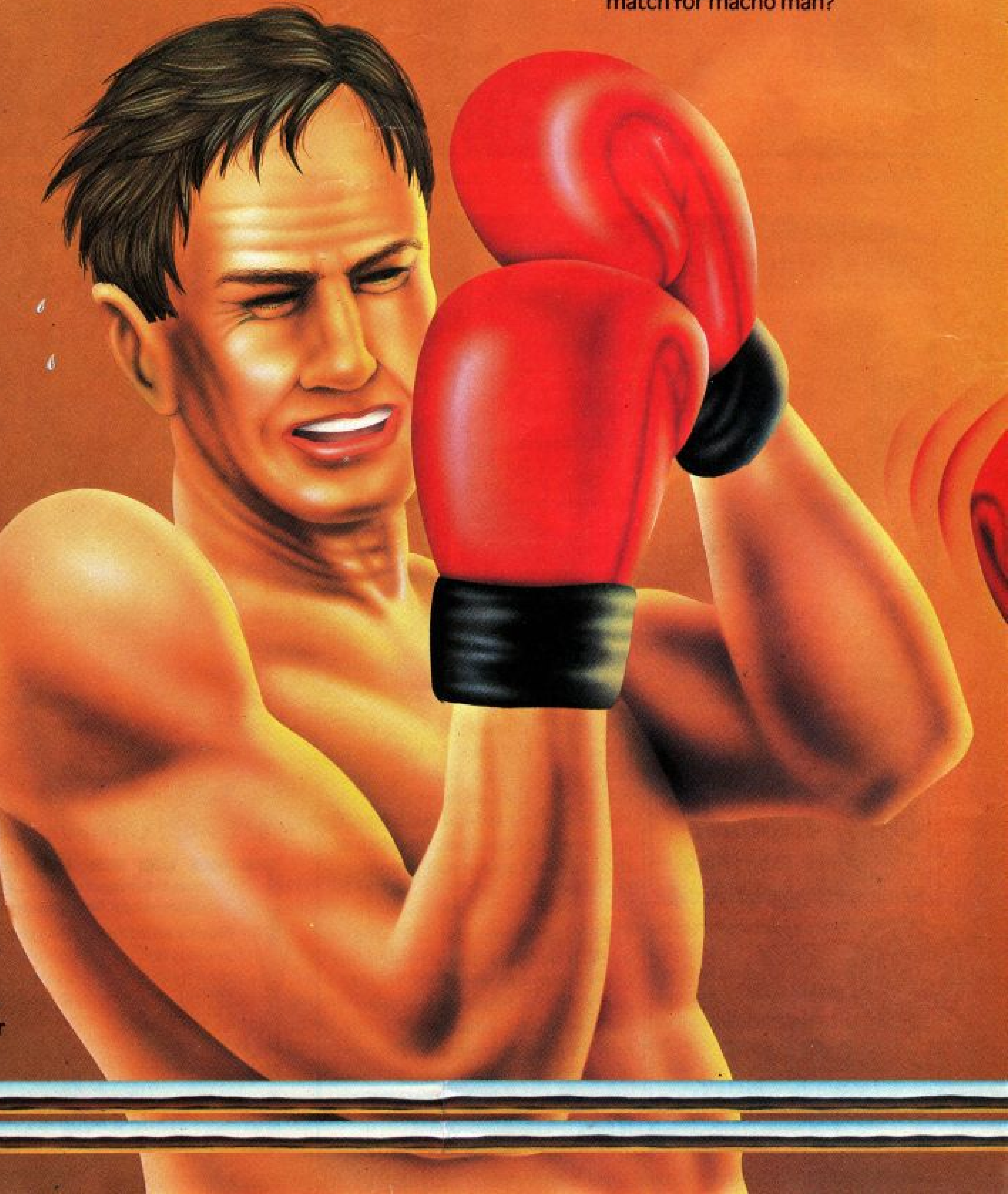
6 RAVIOLI MAFIOSI
ITALY
Ravioli is not a man to mess with. He knows all the dirty tricks, and uses them without a care in the world.



7 ANTIPODEAN ANDY
AUSTRALIA
Fed on a diet of empty lager cans, this man feels no pain. Pure un-interrupted punch power.

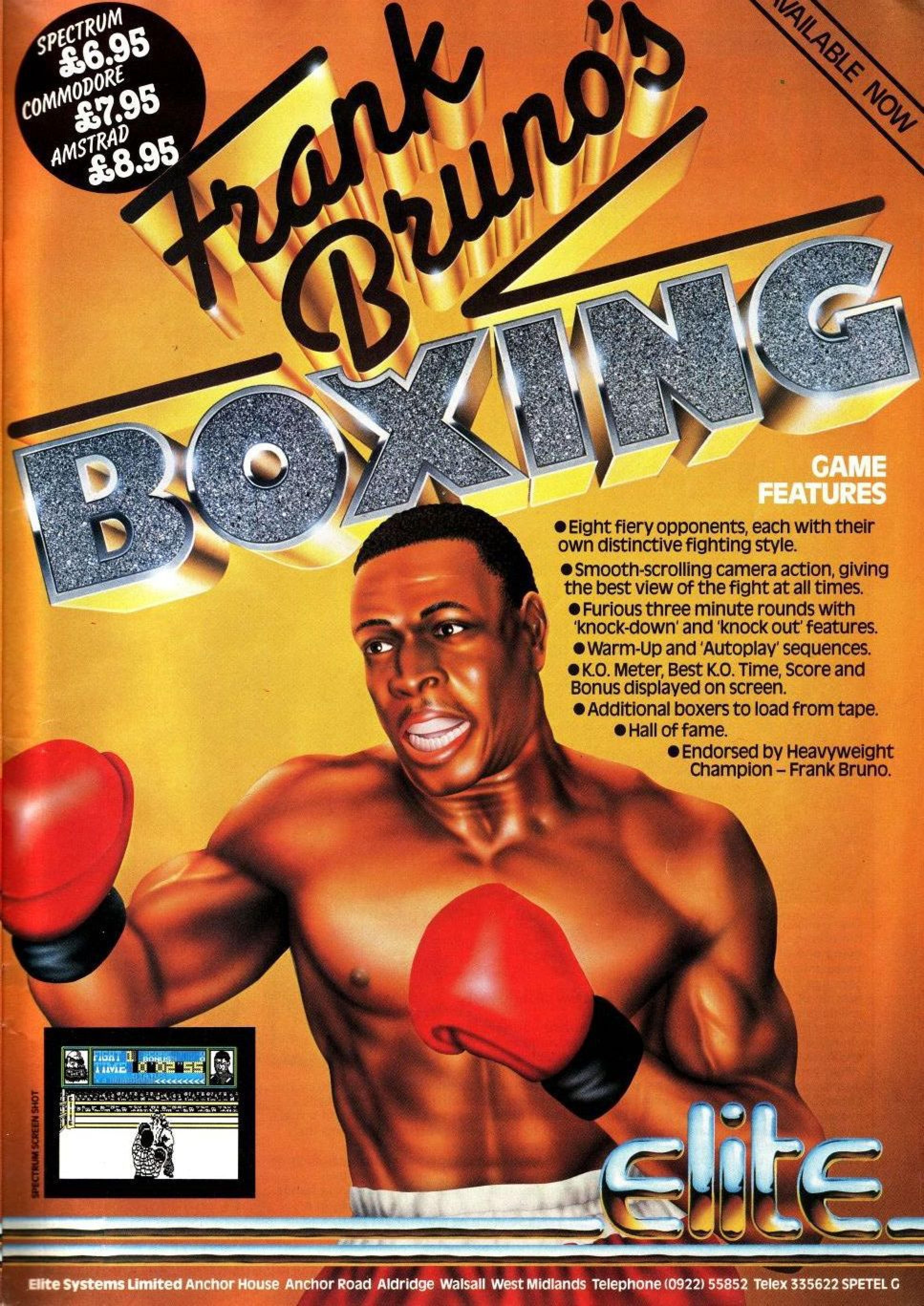


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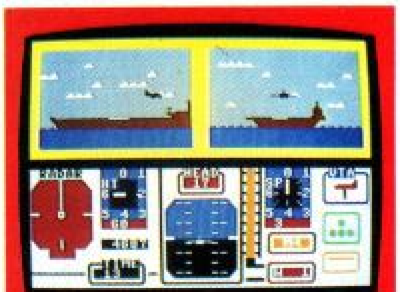


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C16		£7.95

Written by
Vaughan Dow
Jump Jet Pilot





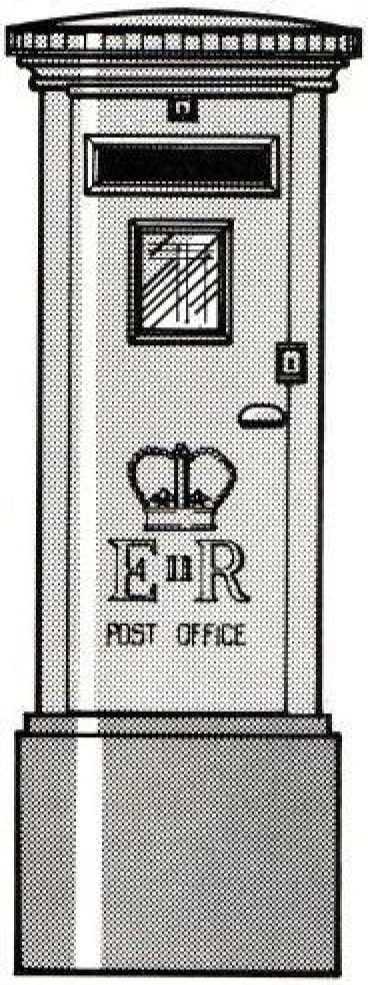
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When you think you have mastered these, then accelerate the Jump Jet into an attack fighter. Use the radar and range finder to seek and destroy the enemy, by launching heat-seeking air-to-air missiles. Beware! His radar and missile systems are as good as yours. Reckless pursuit is ill-advised: you must maintain a fuel level that will enable you to relocate and return to the aircraft carrier, executing the skills you have learned to achieve a successful landing.
You are now ready to proceed to the next skill level to face additional hazards, such as unpredictable swell and treacherous cross-winds.
Be warned, this program is not a toy or game. You will need to co-ordinate your hands, eyes and mind to successfully complete each mission. Do not hope to achieve in a short time that which took the author three years to learn as a Jump Jet pilot, and over a year to record on this computer program.

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Please bear in mind that the views expressed herein are not necessarily those of Amstrad or Amsoft. Be assured that all your views are given thorough consideration. This letters section is the Amstrad Computer User's own forum.

Write to reply



Plotter Fan

I was interested to read in June's 'Amstrad User' the review of the Silver Reed EB50 printer as I bought one in April to use as a printer for my CPC464. I certainly am very pleased with it, particularly because I just plugged it in and it was immediately compatible (no wires to be cut or interfaces bought) but one does pay a price in some areas:

i) it is quite slow (7 cps for medium size print);

ii) the paper feed mechanism is quite fussy about thicknesses of paper;

iii) the inks tend to run out quite quickly and it would be nice to be able to buy just the black pens;

iv) I haven't found out how to access the character set after ASCII 127 and so can't get a ' symbol to print under computer control (any advice?!)

All in all, good value for a printer that is near letter quality and can be used as a portable electric typewriter. It also works well with AMSWORD but can't make full use of the Printer Controls or 2nd Character Set.

Now that the Amstrad computer is established you might consider dropping one or two of the titles Amsoft brought out in the rush to get software prepared for the launch and in the months following. The only reason I still load 'Admiral Gaff Spee' and Myrddin's awful 'Flight Simulation' is because I can't believe they can be as bad as they seem, there must be more to them! As for the flight simulator, it has so many bugs it is in dire need of pest control. Try building up speed on the runway and instead of taking off just stay on the ground. One can tour (and stop at will) round the 3D objects at 400mph on the ground! Coupled with unrealistic navigation systems, aircraft repsonses and slow graphics, this makes for very poor value for money. How about getting Dr. Soft to convert their Beeb simulator or US Gold to convert Solo Flight!

H. Swift
New Delhi

ACU: *You can buy a set of four black pens in a Tandy shop, although I don't know about availability in India. It looks as though most of the US Gold titles are going to be converted so we may see Solo Flight.*

Hi-Tech Farm Tool

I am middle aged conservative and after much deliberation, comparison and haggling, purchased a CPC464. Great- even though the kids "sneer" at the two finger plodder I feel I am getting somewhere.

I primarily purchased the computer for my farming operation - budgets, accounts etc using spreadsheet and I am trying to build a cross index flip file, system for stock records and pasture management. Suitable, reasonably priced agricultural programs would boost sales of CPC464 in NZ, as most of the farming community is becoming computer orientated (we are not all upside-down Worzel Gummidges!)

I am happy with my progress and the simplicity of the CPC464 but feel we are being short changed down here. It would appear that UK purchasers got issue 1 of CPC464 User free, whereas we had to pay and did not receive issue 1 but started at 2 -for shame. A duffer like me needs every bit of help available (I also live 40 miles from town so joining a user club - which doesn't exist is out of the question.

Will the tape - disc swapover scheme you envisage in the U.K. also be in operation around the world as we can't get disc software yet (or hardware for that matter) although it is promised immediately?

I ask that you keep we CPC464 down under users up to date as Japan is closer than the U.K. and they would love our whole market.

A.M. Rickett
New Zealand

Too few Applications

I own an Amstrad Computer CPC464. Mainly I use it for wordprocessing; nearly forgetting my faithful typewriter. Of course I use it for games occasionally.

Reading the User regularly, I realise that the software advertised in it is mainly games and for businesses. Therefore, giving the impression that Amstrad is mainly for business and a 'toy computer' to potential buyers.

As the Amstrad's specifications match any other computer's it's time that Amsoft effectively exploit the Amstrad by producing more educational and learning aid software.

Not only businessmen but the general public and other categories of professionals are using computers. Therefore, most of these potential buyers will want to buy computers which have more educational and learning aid software; for example, for research.

The point I'm trying to make is that Amstrad seems to be concentrating itself in the business and games department rather than toward other applications. I seek your views.

A. Zach
Singapore

ACU: *If Amstrad is concentrating too much on business applications and games, it is probably because there is a much greater demand for this than for any other form of software.*

View From Down Under

Having recently purchased an Amstrad CPC64, ostensibly for our 12 year old son but 'dad' seems to spend more time on it than the son does. At the same time as the computer was purchased we also obtained the Feb., March and April copies of 'The User" Magazine.

I would like to compliment you and your staff on this excellent publication. Whilst magazines are not cheap out here, yours costs $3.50, and imported magazines are always a month behind the current issue date, the information contained in 'The

User" is, in my estimation, well worth the cost.

Having said that, I will now list the problems and some suggestions which have arisen from endeavouring to load some of the programs which have been published in the issues mentioned above.

TRENCH ATTACK (March Issue)

```
440 j=0:FOR i=0 TO 23:j=j
+0.2:x=2mj:x=INT(x=10)/10
```

The x=2mj part of this line, whilst it would type up on the screen as x=2mj was stored in the memory as x=2 mj. We got over this one by entering x=2*mj.

```
1100 IF SQR((xp-xm)M2+(ym-yp)
m2)>2s+2 THEN RETURN
```

This line came back repeatedly as a syntax error and after a fair amount of experimentation and frustration was accepted by the computer when written

```
IF SQR((xp-xm)*m2+(ym-
yp)> s+2 THEN RETURN.
```

Programs such as "Missile Attack" and "Deep Thought" have, apart from the usual typographical errors, operated without any problems.

The greatest problems, so far these have not been able to be solved, have occurred with the adventure games, "The Monster's Final Hour" and "Jack and the Beanstalk".

Bearing in mind that I am an absolute novice as far as computers are concerned and accepting that setting-up errors have to be expected in any publication, I have come to the conclusion that I am doing something entirely wrong, or there is possibly a printing error in both programs which I am unable to locate.

Having entered, checked and edited where necessary, I always end up with the same problem in both programs. When each program is run, a 'syntax error' is created at line 380 in 'Jack and the Beanstalk' and at line 460 in the 'Monster's Final Hour'. It would appear that whilst the computer will accept the location data, it will not accept the object data in both cases. Whilst I feel it is 'me' that's going astray somewhere I can't work out where that 'somewhere' is! Can you help? please'.

I gather that the data is connected with the 'dimension' entries but I don't have the experience or the expertise to be able to work out their exact relationship.

Unfortunately, I do not have access to an Amstrad User Group for the simple reason that areas in Australia such as this one are somewhat remote; the nearest user group to Busselton is 150 miles away on the outskirts of our capital city, Perth. Outside that city, computers are sold normally through electrical goods retail outlets and the retailer's knowledge of his products is usually very limited. As a result of this, the quest for information and or assistance can be a problem. There is hope that in the not too far distant future there will be enough purchasers of the Amstrad in this area to form a Users Group. On enquiring from the distributors in Perth, I was told that twelve Amstrad's had been sold in this area but 12 was not considered a sufficiently large number to warrant the backing of the distributor and 'this area' could mean an area of some 700 to 800 square miles or more.

This leads me to my suggestion which is based on a publication such as "Electronics Australia" and "Electronics Today International". When projects in these publications are found to have errors, printing or otherwise, these are connected in the following month's issue and are, of course, invaluable to the 'not so expert' hobbyist. If your publication could do the same sort of thing I am sure that it would be greatly appreciated.

The CPC464 is the first computer we have purchased and we are highly delighted with its ease of use and performance. Our son finds it easier to use than his friend's Commodore '64, although the Commodore seems to be more popular in this area but this could be due to the fact that the Commodore is retailed by the big chain store groups, whilst the Amstrad is only available through the smaller retailer - as far as we could ascertain there were only three of these in this area at present. The CPC464 is cheaper (and better) at $499; for the green monitor version and $699 for th colour monitor model, against the Commodore '64 at $460 without monitor, although this price includes a program package.

Once again, congratulations on your publication - please keep it up

A. Thompson
West Australia.

ACU: We printed corrections to the programs you mentioned in the May issue. The 2mJ should be a 2 ↑ J in Trench Attack. A correction sheet is available for Monsters Final Hour (send an SAE if poss.), but we are 100% positive that 'Up the Beanstalk' is OK.

Memory Saving

I have found a handy way to "claim back" some of the memory wasted when writing Basic programs. Two uses of this are that a program will not take as long to load, and programs can be made more complex with the wasted memory available.

The memory is used up in a way that is invisible when listing a program normally. It occurs when lines are copied using the Copy Cursor method (Page F2.8 in the manual). If the cursor runs past the end of the line being copied, extra spaces are created at the end of each line. Each space takes up a byte of the memory, even though it is invisible. To get rid of the spaces, you must first be able to see them. To do this LOAD the program, and type in this

```
SYMBOL AFTER 1: SYMBOL 32,85,170,
85,170,85,170,85,170 [ENTER]
```

This converts the space to a checked square. Now list the program.

You may on some lines see a row of checks at the end - these are the spaces. Copy the lines, missing out the checked squares at the end. When you have gone through the program, butting out the unwanted blocks, reset the space symbol by typing:

```
SYMBOL 32,0 [ENTER]
```

I used this process on a program I had written, and salvaged 2K of memory.

A. Cooper
Suffolk

In the Round

First I'd like to point out a few weak points of the Amstrad if I may. The CPC464's printing speed on the screen is extremely slow. Surely if Locomotive Software could write such a fast Basic they could have speeded up the print speed. I'm no expert on the machine's design but I assume the reason for this is the Rom overlay technique?

The CPC User is excellent, I class it as the best dedicated magazine around. You cater for all levels of programming and all aspects of the computer, brilliant. Keep up the excellent articles on machine code.

Finally, if I may, I'd like to contribute to CPC User. The CPC464 has very powerful graphic Commands but it does a CIRCLE command. The short routines included will rectify this problem. To use them simply XC% to the X coordinate of the centre of the circle, YC% to the Y coordinate, rd% to the radius of the circle and sp% should be set to U in Mode 0, 2 in Mode 1 and 1 in Mode 2. The first routine will just draw the outline of a circle in the current graphics ink colour where as the second routine will draw a 'filled in' circle. Please note, no sine or cosine expressions are used as these are extremely slow. I have used a much faster method, Pythagoras' theorem. The radius cannot be larger than the square root of 32767, this is because 32767 is the largest value that can be stored in an integer variable.

Routine 1 and 2

```
65000 MOVE xc%-rd%,yc%:rs%=resd%*rd%:FOR hf% = -1
      TO 1 STEP 2:FOR z%=-RD% TO RD% STEP 4:Y%=
      SQR(rs%-(z%*z%))*HF%:DRAW xc%+z%,yc%+y%:
      NEXT:MOVE xc%-rd%,yc%:NEXT:RETURN
65010 RS%=RD%*RD%:FOR z%=-RD% TO RD% STEP SP%:y%=
      SQR(rs%-(z%*z%)):MOVE xc%+z%,yc%+y%:DRAW x
      c%+z%,yc%+y%*-1:NEXT:RETURN
```

Stephen White
Ayrshire



Amstrad Computer User is owned by Amstrad. Epson is owned by Seikosha. Computing Today is owned (ultimately) by British Electric Traction. The subject of who owns what is quite fascinating.

Obviously Robert Maxwell became jealous of Alan Sugar's dual role of Press Baron and Computer manufacturer and decided the he too would have a go, but there is no truth in the rumor that Amstrad are considering buying The Sun from Rupert Murdoch. We will never confuse memories with mammeries.

Notwithstanding all this, Amstrad User is in a good position to provide the Amstrad news first. Because it is a magazine written by Amstrad Computer Users for Amstrad Computer Users, it is looks at everything from an Amstrad angle. We seldom write about non-Amstrad matters since there is always much that is positive and interesting on the subject of Amstrad to cover the space available.

So....remember when you write to Amstrad User you are not writing to Amstrad. Do not enclose orders to the User Club or Amstrad, or worse still some software for Amsoft evaluation, as it is a sure way to slow things down.

Competitive

Amstrad Computer User runs the Bi-Monthly software competition in conjuction with Amsoft. The £2,000 prize attracts a lot of quality entries and not surprisingly these take a lot of time to be looked at. If you send something it will be judged and filed away. Not all the losers have the entries returned. Some are listed in the magazine, and we have various plans to put the others in front of a wider public. So if you sent a program in and have not heard from us please wait, we will get back to you.

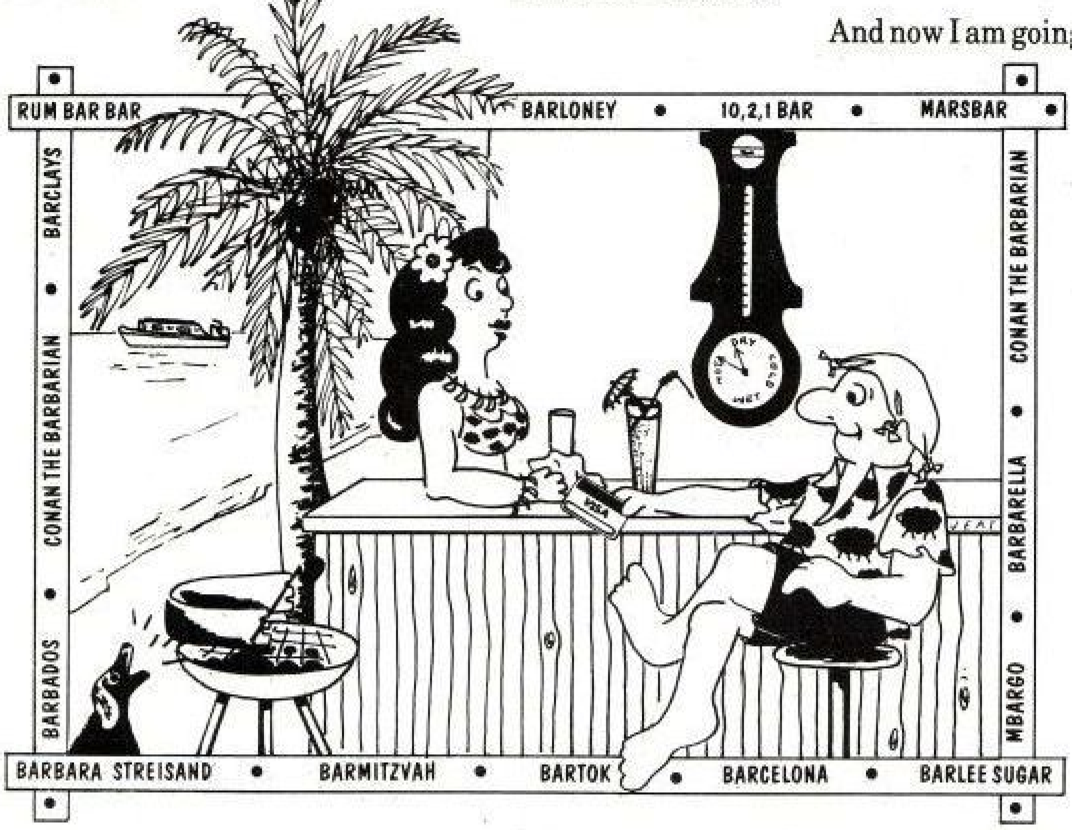
How many bars can you spot in this picture? The bar competition in the June issue was a great success. Have a look at the picture below and see how many bars you can spot. We will raid the shelves and award some prizes for the five best. Good luck.

William Poel &
Simon Rockman

RSX Bar Competition

Now for the winners of our silly | (bar) competition.

Needless to say there were very many entries and we all had a good laugh sifting through them. The lucky winners of a copy of 'Roland in Space' were: John Skinner of Gosport; Peter Finbarr-Smith of Newbury; Ewen Flint of Dumfires; Raymond Forward of Penzance; and Roger Johnston of London.



And now I am going to M | K on giving you a taste of some of our favourites:

Rum | |
| Loney
10,2,1 |
Mars | (or even a packet of CHRS$)
| bados
| | A Str$and
| Mitzvah
| Tok
| Celona
Conan The | | ian
| Clays (RSX Data Bank)
M | GO
| | Ella (female space going nut)
| rie Manilow

But I was unanimous in deciding that the 'piece de resistance' just had to be: | Lee Sugar!

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____

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ARCADE AND ADVENTURE games. Ten for £3 while stocks last send S.A.E. plus cheque/P.O. to: A. Cooper 4, Carol Avenue, Martlesham Woodbridge Suffolk.

Mini-Office Alien-Break-In Easi -Amsword Star-Commando Harrier-Attack Bargains!! All originals £20 only. Hi-Soft Pascal 4T complete documentation unused £25 only all cassettes Cheques/P.O. to A. Suleiman 68, Dunkley Street, Wolverhapton Tel. 0902-714031 after 6pm.

Male 34 wishes to communicate with females using mini office word processor. Send your introductory cassette and I will reply using the cassette which can be re-used. Give file name, Mr Harman 74, Arthur St. Withersea, N. Humberside.

AMSTRAD DMP1 printer with leads paper easi-amsword and manual 6 months old and new condition £130 bargain phone (0506) 37602.

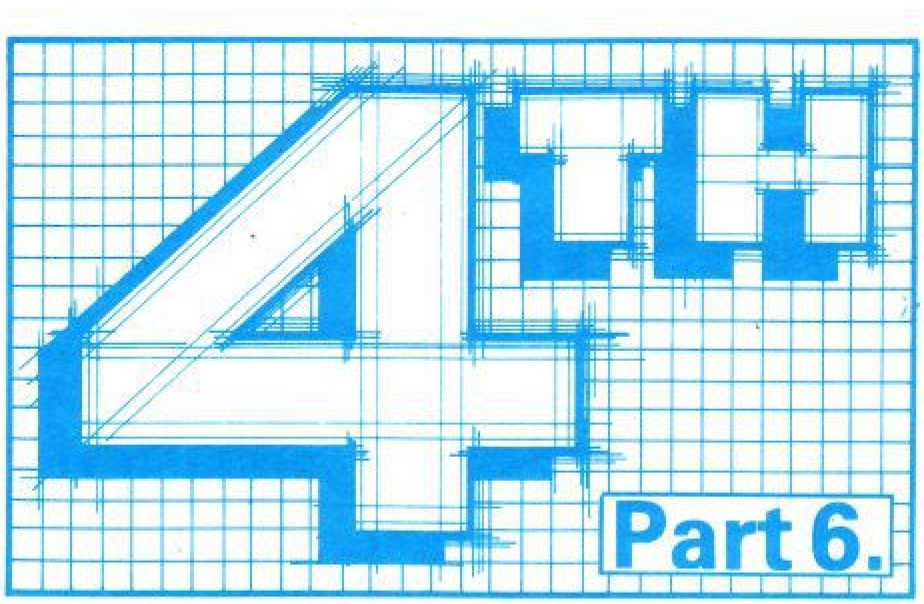
Amstat statistics package - Amstat1-means S.Devs. T-Tests, 1 Way Aov, 2 Way Aov, Correl, Regression Historgrams, Scattergrams, Manual. £14.99. £19.50 disc) cheques to S.C. Coleman 33 Leicester Road. Ashby-De-La-Zouch Leics LE6 5DA

Machine code beginners' guide, seven pages of M/c information to get you started, plus user group newsletter £1.00 to, Nick Godwin, 4 Hurkur crescent, Eyemouth, Berwickshire TD14 5AP

‹DRAW1› Full screen pixel editor package, invaluable tool for precision colour graphics creation, editing (CPC464 MODES 1 AND 2). Cassette £3.80. 98 West Heath Road, Farnborough, Hants, GU14 8QY. LIZARD PROJECTS.

Typewrite 464 - Turn your Amstrad into a versatile typewriter directly linked with your printer, Includes many important features £4.50 (incl P+P). G.Kendall, 54 Stanbridge Road, Leighton Buzzard, LU7 8QJ

TAPE ORIGINALS with full documentation. TITLES: Pyjamarama, MasterChess, Staravenger, SpaceHawks, Roland on Run, Manic Miner, Electro Freddy, £5.99 Return to Eden, Typingtutor £6.99. Rajiv Kapur, Beggart House, Broadway, Belfast.



The Forth Assembler

We have seen in previous articles how new words can be defined by using the colon and semi-colon defining words. These new words were created by using the words already defined in the dictionary. It is also possible to create new words that contain actual Z80 machine code. Instead of a list of words appearing in the new words parameter block, this block will contain the machine code, which will be directly executed at run time. If you are accustomed to using an ordinary Z80 Assembler, then the FORTH Assembler may come as something of a shock. In true FORTH tradition, the Assembler works in Reverse Polish. So instead of saying LD B,123 you would say 123 LD B. However, many of the FORTH Assembler words go back to the old 8080 chip and the 8080 mnemonic for 'LD' is 'MVI' so you would have to say 123 B MVI. But this is FORTH, get rid of all those outdated mnemonics! As many operations involve the loading of registers, it would be advantageous to create some new words which make more sense -especially if you are not used to 8080. For starters try the following new words, but remember that they should go in the ASSEMBLER VOCABULARY, so type ASSEMBLER DEFINITIONS and any new words created now will be stored in this vocabulary:

```
:\LD-A  A MVI ;
:\LD-C  C MVI ;
:\LE-E  E MVI ;
:\LD-L  - MVI ;
:\LD-DE DE LXI ;
:\LD-B B MVI ;
:\LD-D MVI ;
:\LD-H H MVI ;
:\LD-BC BC LXI ;
:\LD-HL HL LXI ;
```

You could change or modify as many of the words as you feel necessary. Although this will use up some memory, lack of memory is not one of the CPC's problems. If you're feeling mean and wish to replace a name with a name of the same length, then you could just 'poke' the new ASCII characters of the name into the memory locations occupied by the old name.

Several of the Z80 registers are used by FORTH itself, so care has to be taken to save the value in the registers by PUSHing them onto the stack at the beginning of the word, and POPping them off the stack at the end of the word. The registers that are affected are BC, IX and SP.

Another oddity is the use of labels. Using DJNZ or JR's can be difficult. Instead of these, the FORTH high level control structure loops can be used, which although unusual for an Assembler, does produce a much better structured program. A machine code program in FORTH is therefore very much the same as high level FORTH - a series of small structured 'blocks' - a block being a FORTH word.

So much for the oddities - now let's get down to some examples.

There are several FORTH words that can be used for creating new machine code words. The most common is CODE. This is a defining word, so at compile time it will place the word that follows into the current vocabulary (FORTH or ASSEMBLER etc.) The code field address will 'point' to the PFA of the new word, so at run time the machine code instructions in the new words parameter block will get executed. Using some of the 'jumpblock' addresses it is easy to create new words:

```
HEX CODE CASON    ( create new word CASON )
BC6E CALL         ( call &BC6E jumpblock  )
NEXT C;           ( jump to NEXT          )
CODE CASOF        ( create new word CASOF )
BC71 CALL         ( call &BC71 jumpblock  )
NEXT C;           ( jump to NEXT          )
```

The number base is set to HEX first although you could use DECIMAL if you so desire, or even OCTAL (8 BASE !) or BINARY (2 BASE !). CASON is the new word which turns the cassette motor ON. A CALL is made to the jumpblock at &BC6E. Remember that when working in HEX in FORTH, do not use '&' before the values as in BASIC - there is no need. NEXT is a special FORTH word that compiles the instruction Jump to the address of 'NEXT' which is the address where FORTH returns to after the word has been 'RUN'. C; is also a special FORTH word that makes a few error checks and unsmudges the dictionary header for the word if it is OK. CODE and C; can therefore be compared to the semi-colon defining words. Similarly the word CASOF is created which....you've guessed it....turns the cassette motor OFF. So CASON and CASOF can now be used just like any other FORTH word, and can therefore be used as part of a new word. You don't have to worry about where the machine code program is located in memory, or the address of where to 'CALL' it. It's all there in the dictionary, which if you take

a 'peek' at the memory locations for the parameter blocks of these words (starting at the PFA of the word) will reveal the assembled machine code. The full list of available routines that can be called via the jumpblock are published in the 'CPC464 FIRMWARE' book - essential reading for any serious machine code writing!

It is possible to pass values to and from FORTHs PARAMETER STACK and a machine code program. All PUSHes and POPs used in the program will reference the normal FORTH Parameter Stack. When NEXT is used at the end of a word, no values are returned to the stack. If you have one value to return, then put it in the HL register pair and use the word PUSHHL, which will put the value on TOS and then jump to NEXT. If you have two values to return then place them in the HL and DE register pairs and use the word PUSHDE. This will place the value in HL on TOS, and the value in DE one place below, and then jump to NEXT. For example, look at the following three examples:

```
CODE ADD-ONE       ( new word ADD-ONE               )
     HL POP        ( pop value from stack           )
     HL INX        ( increment HL by one            )
     PUSHHL C;     ( HL to stack - jump to NEXT )
CODE PUT-1         ( new word PUT                   )
     1234 LD-HL    ( Load HL with 1234              )
     PUSHHL C;     ( HL to stack - jump to NEXT )
CODE PUT-2         ( new word PUT-2                 )
     1234 LD-HL    ( Load HL with 1234              )
     5678 LD-DE    ( Load DE with 5678              )
     PUSHDE C;     ( HL & DE to stack..JP NEXT  )
```

The word ADD-ONE pops the current value that is TOS into the HL register pair. This is incremented by one, and then pushed back onto the stack, and a jump is taken to NEXT by the word PUSHHL.

PUT-1 just simply places the value of 1234 onto the stack, and PUT-2 places two values onto the stack. These are purely examples - the last two words would not be of much use in a program as they would just be replaced by the values 1234 and 5678. Note that I have used the new words for loading the registers. I am sure that they make more sense than the standard FORTH words supplied.

If you refer back to last months aritcle on formatted output, we can now use a machine code word to get the TIME value of the CPC464. This is a count (in 1/300ths. second) of the time since the machine was switched on or reset. The machine code word TIME in listing 1 calls the jumpblock at &BDOD which returns the time into the DE (most significant) and HL (least sigfnificant) registers pairs. As we need the most significant bytes on TOS these should be in the HL pair -hence the need to swop them over with EXDEHL. PUSHDE then stores the 4 byte count onto the stack.

Remember to set the number base back to DECIMAL before entering the remaining high level words on listing 1, or you will get some unusual results. SEC/MIN was explained in last months article. CLOCK is different from last month in that it also prints out the fractional part of the seconds (in 1/300ths). CLOCK can be used to display the time at the current cursor position. DISPLAY-CLOCK can be used to display the time continuously at the top of the screen. The speed that the fractional part of the time goes at, will give you a good idea of the speed of FORTH...it's fast!

Press the ESC key to stop the clock. You could always use the interrupt EVERY (the same as in BASIC) to display and update the clock as required. SET-CLOCK will enable you to set the time on the clock by placing a double number onto the stack before calling the word. 0. SET-CLOCK would zero the clock, for example. The clock is fairly accurate, apart from when writing to, or reading from, the cassette, when it is not updated. It will run for several thousand hours before 'going round the clock'.

Listing 2 demonstrates the use of the FORTH ASSEMBLER and high level control structures. The word ROLL will role the scren UP one line if the value on TOS is non-zero. A zero value will roll the the screen down by one line. As the register B must be used when calling the jumpblock at &BC4D, it must be saved onto the stack and the recalled later. Remember that FORTH uses the BC register as a pointer.

The word LOOPER demonstrates how the DJNZ operation is used. DO when compiled, loads the B register with the value that is TOS. LOOP replaces the mnemonic DJNZ, which decrements the B register and loops back to DO if B is non-zero. In this case whatever value is placed on the TOS will be incremented by 99 when the word is called.

UPPER demonstrates the use of the BEGIN...UNTIL loop structure. The accumulator is loaded with the value for the ASCII space, and then after printing it to the screen it is incremented and tested to see if it equals 91, which is the character after ASCII 'Z'. The loop will perform and print out the uppercase ASCII characters until the zero flag is set. And in case you think that there is a mistake on the listing, there isn't. The flags work the opposite way to what you would expect! Typical backwards FORTH!

TESTER shows how the IF...ELSE...ENDIF structure is used. The value that is TOS is compared to 99. If it is 99 then the value of 26 will be returned else the value of 47 is returned to the TOS. Once again, the flag test is the opposite to what you would expect!

Apart from the DO...LOOP, all of the control structures available in high level FORTH can be used in the ASSEMBLER. Perhaps I should point out that any high level words that appear in the assembly listing will operate 'immediately' - ie they will not be compiled. The word UPPER is an example here where HEX and DECIMAL have been used part way through the listing.

The final word CASON shows another way of creating a machine code word without using the ASSEMBLER. CREATE is a FORTH word that will create the header for the word that follows (CASON). The machine code opcodes are then put into the dictionary by the ',' (comma) word. SMUDGE terminates the routine The pairs of bytes have to be 'reversed' to get them into the right order. The last pair is the address of NEXT (&2812) where FORTH needs to jump too. As the assembler is easier to use, it's unlikely that you will bother to use this method.

Listing 3 shows how the Assembler can be used to control the 'DOING' part of a defining word (see part 4 for details of ‹BUILDS..DOES›). In this case the building part will print 'THIS IS BUILDING' at compile time and the doing part will take the value on TOS and double it. So - MACHINE is the new defining word - if you said MACHINE TIMES2 this would create the new word TIMES2 and print out 'THIS IS

BUILDING'when it is compiled. The if you said 6 TIMES2 this would take 6 off the stack, double it, and place it back on the stack. As with the other words (apart from ROLL) these are only examples - they are of little use in normal operations, but hopefully they illustrate the use of the Assembler more clearly than other more useful words might.

As you may well gather, the FORTH ASSEMBLER is unusual, but with the ability to change the Assembler and create new defining words, the potential is interesting to say the least! It should be noted that the FORTH Assembler does pot make many checks on the code, such as whether or not the relative jumps are within bounds or not. In practise this is not too much of a problem. The way to write machine code in FORTH is to use lots of words - each word being tested on its own. Once the words are working correctly it is then simplicity itself to call these words high level FORTH in the correct order. The only problem of writing a machine code FORTH word, is that it is then only 'transportable' between machines using a Z80 chip, and not those using say a 6502

Summing Up

As this is the last article in the series I thought that I had better try and cover a few areas that may be of interest, especially to the non-FORTH user.

Temporary stack storage

As we have seen, much use is made of the paramter stack in FORTH. There are times when it can get a bit 'hairy' and it sometimes helps to use the words >R which transfers the value that is top of the paramater stack,to the return stack, and R> which transfers the value back again to the parameter stack. You can think of it as another stack to which you can PUSH and POP values. Like any stack though, you must make sure that you POP the same number of values as you PUSH, otherwise all hell will break loose.

Compile/Immediate

The majority of FORTH words are compiled into the dictionary - or to be more precise, the CFA of the word is compiled. Some words are IMMEDIATE - ie they do not get compiled into the dictionary but instead they control the way in which the dictionary entries are built. Words such as DO...LOOP, IF...ELSE...THEN, REPEAT...UNTIL, and other control structrues are all examples of Immediate words. If bit 6 is set in the words length byte ("=+) then the word is immediate.

A word can be defined as immediate simply by typing IMMEDIATE after it has been compiled into the dictionary. An immediate word can be forced to be compiled (the CFA of the immediate word is compiled into the next dictionary location) by using the word [COMPILED] before the word that is immediate. For example:

```
: NEW-WORD [COMPILE] : ; IMMEDIATE
: END-NEW-WORD [COMPILED] ; ; IMMEDIATE
```

In the fist word NEW-WORD, the DOCOLON word is forced to be compiled when it is normally immediate.

NEW-WORD is then marked as an immediate word. Instead of using the colon, you could now ue NEW-WORD which will perform the same function. Similarly, END-NEW-WORD could replace the semi-colon word. So:

```
NEW-WORD SHOW-OFF ." I can do anything! " END-NEW-WORD
```

Would create the new word SHOW-OFF, which would print 'I can do anything!' at run time.

The left square bracket '[' can also be used to suspend compilation in the middle of entering a new word. This comes in very useful, as there are many times when you are half way through a word when you may wish to do some calculation or other, or even list the directory of words, or perhaps use -FIND to see if a particular word exists. Typing the right square bracket ']' will resume compilation of the new word as if nothing has happened.

"The Forth Sreens"

It is convenient to do so. Each screen is 1K in size and consists of 16 lines (numbered 0 to 15) with 64 characters per line. Line 0 is usually reserved for comments. On the subject of comments, these can be placed anywhere within a FORTH definition provided they are enclosed within brackets, and a space is left before the first character and the last character within the brackets. Listings 1, 2 and 3 show this in practise.

The number of screens available on the tape version of the CPC464 is 11 giving 11K of storage for 'programs'. This may not seem a lot, but FORTH is a very compact language and this should be ample. FORTH was designed to be used with a disk system, each screen being saved to, and recalled from disk. With a disk system, the number of screens is therefore far greater. When you are satisfied with the contents of the screen(s) the words making up the program can be compiled by using the word LOAD preceeded by the screen number tht the compiling will take place from. The contents of the screen can be saved to, and loaded from tape or disk, in a similar way that a BASIC program is.

A FORTH program

Although we have created many new words, some useful, and other for purposes only I have not discussed the format of an actual program. Some of the new words that have been created will become an integral part of the FORTH dictionary, and hopefully these, and others that you create yourselves, will make writing a program that much easier. A 'space-invader' type program may look somthing like:

```
: SPACE-INVADERS
  BEGIN PRINT-OPTION
        GET- OPTIONS
        PLAY-GAME
        END-OPTIONS AGAIN ;
```

Each of the separate words would contain the necessary operations for the game, and these would be made up from other new words and the standard FORTH words. These would be stored on a number of screens, loaded into memory when required, compiled into the dictionary by LOAD, and then the program would be run by just simply typing SPACE-INVADERS.

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Conclusion

Well I'm afraid that's about it. There's a lot of things that I haven't covered (like arrays) but I have tried to cover as many things as possible without repeating the same old facts that every FORTH article seems to cover.

FORTH is a unique language - unusual maybe? But it does span a much greater range than most other languages, being capable of extremely high level operations and also very easy to program at low level. It is also very portable, despite there being several variants of the language. For instance, whilst using the CPC464 to write this article I was testing most of the FORTH words (apart from the machine code ones) on a 6502 based machine. The only complaint that I have about FORTH is that it was created when memory was scarce and as much as possible was crammed into about 8K. Little has changed! Despite having lots more memory available the software writers seem reluctant to produce a really good version of FORTH with a lot more high level words as standard than at present. OK, so every version of FORTH comes with 'extension', words that are machine specific, but I feel that the standard core words could be improved on considerably to make FORTH a particularly user friendly language. With the likelihood of speech input replacing keyboard input, FORTH could so easily be the number one choice to ulitmately replace BASIC. Without a major shakeup though, it's unlikely to do this, despite being a lovely language in which to program.

LISTING 1

```
HEX CODE TIME               ( new word TIME                 )
        BD0D CALL           ( call &BD0D in jump block      )
        EXDEHL              ( swop over DE and HL           )
        PUSHDE C;           ( put double number on stack    )
:   SEC/MIN # 6 BASE # DECIMAL 58 HOLD ;
:   CLOCK                   ( new word CLOCK                )
    TIME                    ( get value for TIME            )
    <#                      ( start formatted output        )
    # # 3 BASE  !  #        ( devide by 300 - 3 digits      )
    DECIMAL 46 HOLD         ( put in decimal point          )
    SEC/MIN SEC/MIN         ( convert to seconds/minutes    )
    #S #>                   ( convert remaining digits      )
    TYPE SPACE ;            ( and print out the string      )
:   DISPLAY-CLOCK           ( new word DISPLAY-CLOCK        )
    BEGIN ?TERMINAL         ( test for ESC key pressed      )
    1 = IF QUIT             ( and finish IF it has been     )
    ENDIF 20 1 LOCATE       ( place cursor on line 1        )
    CLOCK AGAIN ;           ( display time and repeat       )
HEX CODE SET-CLOCK          ( new word SET-CLOCK            )
        DE POP              ( get value off stack MSB's     )
        HL POP              ( get value off stack LSB's     )
        BD10 CALL           ( and set the time via BD10     )
        NEXT C;             ( jump to NEXT.....done         )
```

LISTING 2

```
HEX CODE ROLL               ( new word ROLL                 )
    HL POP                  ( pop top value off stack       )
    BC PUSH                 ( save BC as needed by FORTH    )
    L B MOV                 ( transfer value in L to B      )
    BC4D CALL               ( routine to roll the screen    )
    BC POP                  ( restore value in BC           )
    NEXT C;                 ( jump to NEXT                  )
DECIMAL CODE LOOPER         ( new loader LOOPER             )
    HL POP                  ( pop top value off stack       )
    BC PUSH                 ( save BC                       )
    99 DO                   ( equivalent to LD B,99         )
    HL INX                  ( HL = HL + 1                   )
    LOOP                    ( equivalent to DJNZ            )
    BC POP                  ( restore BC                    )
    PUSHHL C;               ( push HL to stack and jump     )
DECIMAL CODE UPPER          ( new word UPPER                )
    BC PUSH                 ( save BC                       )
    32 LD-A                 ( Load accumulator with 32      )
    BEGIN                   ( start of loop                 )
    AF PUSH                 ( save value in accumulator     )
HEX BB5D CALL               ( routine to print character    )
DECIMAL AF POP              ( restore value to A            )
    A INR                   ( A = A + 1                     )
    91 CMPI                 ( subract 91 from A             )
    NZ UNTIL                ( Loop UNTIL NOT non-zero       )
    BC POP                  ( restore BC                    )
    NEXT C;                 ( jump to NEXT                  )
DECIMAL CODE TESTER         ( new word TESTER               )
    HL POP                  ( pop top value off stack       )
    L A MOV                 ( transfer value in L to A      )
    99 CMPI                 ( subtract 99 from A            )
    NZ                      ( test condition of flag        )
IF 26 LD-HL PUSHHL          ( IF NOT NZ put 26 to stack     )
ELSE 47 LD-HL PUSHHL        ( ELSE put 47 onto stack        )
ENDIF NEXT C;               ( continue here after           )
HEX CREATE CASON 6ECD, C3BC, 1228, SMUDGE
```

LISTING 3

```
: MACHINE                   ( new word MACHINE              )
  <BUILDS                   ( create new defining word      )
  ." THIS IS BUILDING"      ( compile time operations       )
  ; CODE                    ( start of machine code DOES>   )
    HL POP                  ( get value off stack           )
    HL DAD                  ( and double it                 )
    PUSHHL                  ( put value back on stack       )
    C;                      ( end of new defining word      )
```

GALLUP SOFTWARE CHART



4 weeks up to 13/6/1985

	TITLE Publisher	Last Month			Months in chart	Market Strength
1	KNIGHT LORE Ultimate	1		664	1	100
2	GHOSTBUSTERS Activision	3	▲		2	62
3	DALEY THOMPSON'S DECATHLON Ocean	2	▼		1	61
4	ALIEN 8 Ultimate	-	NE	664	NE	50
5	3D STARSTRIKE Realtime	14	▲	664	1	46
6	COMBAT LYNX Durrell	5			2	38
7	FIGHTER PILOT Digital Integration	6	▼	664	2	25
8	MR. FREEZE BT Firebird	-	NE		-	23
9	SORCERY Virgin	4	▼		1	23
10	DEATH STAR INTERCEPTER System 3	-	NE		1	23
11	MINDER DK'Tronics	19	▲	664	1	20
12	WILD BUNCH BT Firebird	12		664	2	18
13	JET SET WILLY Software Projects	7	▼		2	17
14	MINI OFFICE Database Publications	9	▼	D 664	2	13
15	DARK STAR Design Design	-	NE	664	-	13
16	MANIC MINER Software Projects	20	▲	D A	2	12
17	WORLD CUP Artic	-	NE		-	11
18	CONFUZION Incentive	-	NE	664	-	11
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Starting Pascal

By David Robinson

This article aims to take any of you who are prospective Pascal programmers a stage further on from the short examples presented in the review and examine the anatomy of a much larger Pascal program. Even if you don't intend using Pascal there should be some useful pointers for Basic programmers who are looking to improve on the ease of maintenance of their programs.

Most of the troubles with Basic can be avoided by good programming practice but there are penalties to pay in terms of size of program and speed of execution when the program is run. Thus most of us degenerate at some stage into using 'tricks' to save space or make things happen a bit more quickly. Typical examples are long multi-statement lines and short variable names. All is usually well while you are working on the program but if you've ever returned to one of these 'spaghetti Basic' programs after a lapse of a few weeks you will know only too well the agony of trying to re-learn the logic of what is going on.

Pascal encourages good programming simply because there are no benefits to be gained from writing 'spaghetti code'. When your programming masterpiece is compiled all the Comments (Basic REMs) and long variable names are left behind and don't affect the length of the program. Similarly using multi-statement lines won't increase execution speed - only decrease readability - so we don't use them.

Another big difference is that you can't simply sit down and start typing in statements the way you can with Basic. To write almost anything worthwhile you must plan out the structure of your program and then write out the Source Code (the High Level instructions which the compiler changes into machine code) using pencil and paper. Unlike Basic it can take quite a long time before you can have anything running on the computer at all.

As an example which can be compared with Basic I have chosen the 3D Surface Plotter which appeared in issue 2. Some of the most detailed plots from this program can take forever and a day in Basic so the speed improvment of Pascal is worth having (30 minutes down to 1 or 2 is typical).

If you study the Pascal source listing of SURFER you will see that the program has three distinct areas which Must Always be in the order presented here -

1 The DECLARATION of CONSTANTS and VARIABLES used.
2. The FUNCTIONS and PROCEDURES which are the rough equivalent of BASIC subroutines.
3. The MAIN PROGRAM which is usually quite short.

Here are a few things to look out for as we take a trip through the program -

1. Variables declared at the start of the program work GLOBALLY throughout the program whereas those declared inside Procedures and Functions are Local to that Procedure / Function only. This is a very useful feature which allows you to forget about using a variable name which corrupts something in another part of your program.
2. Procedures and Functions can only use other Procedures / Functions which have already been written - compare this with the total flexibility you have with the placement of Subroutines.
3. Line numbers are there only for the convenience of the program EDITOR and have no other significance.
4. Any GOTO's are referenced through the use of LABELS.
5. Indentation of lines is not compulsory but used to make the program much more readable and incurs no space or time penalty.
6. COMMENTS are contained within curly brackets ( ) but note that entries such as ($C-) are known as compiler directives (ie an instruction to the compiler to perform a task).

O.K. let's take a trip though the program source listing and see what's there:

1000 The program name - this MUST be the first compilable line.

1040 to 1520 Declaration of all GLOBAL variables. Note how the TYPE of the variable is also declared so that lokking at the name only won't tell you what sort a given variable is. Compare this with Basics % for Integers and $ for Strings.

3365 to 4679 Mainly primitive Procedures building into our program some desirable facilities which are not available in standard Pascal. David Link of HiSoft has provided a beautifully elegant way of accessing all of Arnold's firmware ROM routines via the built in (undeclared) global variables RA, RB, RC, RD, RE, RH, RL, RBC, RDE, RHL which correspond to the Z80 chip registers. The single register variables are of TYPE CHAR (ie a single character) and the register pairs (BC,DE,HL) are of TYPE INTEGER. All you have to do is set the value of the variable to the appropriate value then CALL the necessary firmware routine via the non standard command USER. You will see this technique used a lot here to implement the facilities which are not available in standard Pascal. You might reasonably ask why HiSoft did not implement these features directly as commands - well the answer is that to do so would have used up so much memory that no working space would be left. Instead by taking this approach you can use only those routines which you need and have access to a larger workspace instead. The HiSoft manual contains a good listing of useful routines but if you want to do something unusual you will need a copy of the Concise Firmware Spec which is a must for serious programmers.

4700 to 6760 These are the higher level Procedures which often repeatedly use the lower level ones declared earlier.

You can almost use the primitive procedures as if you had

made up your own language Note how the GOTO's only work within the Procedure in which the LABEL was declared. In the Procedure GETDET which is used for input of the picture variables a READ statement is used for keyboard entry. This is similar to the BASIC INPUT statement but differs from it in that the entry of, say, a string where a REAL was expected will cause the program to stop with an error message. It is here that we encounter the less than perfect side of Pascal where the language is almost as deficient in secure fundamental input as Basic is deficient in structure. Fortunately, because we can define our own procedures which then behave just like program statements we can rectify the problem with some programming effort - but this will have to be postponed to a future article.

6780 to 7020 AT LAST ! The program proper which is so neat and compact anyone can see just what is happening almost immediately.

```
1000 PROGRAM  DP;
1010
1040    VAR   Height,
1060          Wide,
1080          Detail,
1100          Dist,
1120          Pers,
1140          Halfwit,
1160          Sqrwit,
1180          Halfht,
1200          Qtrht,
1220          Compw,
1240          L, K,
1260          Phi,
1280          Theta,
1300          Tau,
1320          Sigma,
1340          Rho,
1360          Zeta,
1380          Xp,
1400          Yp
1420                        : REAL;
1430
1440          Xpix,m,
1460          Ypix          : INTEGER;
1470
1480          Key           : CHAR;
1490
1500          Pure , Exit   : BOOLEAN;
1520
1530
1540 FUNCTION TEST(Xc,Yc : INTEGER):integer;
1560   BEGIN
1580     RHL:=Yc;
1600     RDE:=Xc;
1620     USER(#BBF0);
1640     IF RA=CHR(1) THEN TEST:=1 ELSE TEST:=0;
1660   END;
1670
3365 PROCEDURE PLOT(Xpix,Ypix : INTEGER);
3366   BEGIN
3367     RDE:=Xpix;
3368     RHL:=Ypix;
3369     USER(#BBEA);
3370   END;
3375
3380 PROCEDURE MODE(m : INTEGER);
3381   BEGIN
3382     RA:=CHR(m);
3383     USER(#BC0E);
3384   END;
3386
3390 PROCEDURE LINE(Xpix,Ypix : INTEGER);
3391   BEGIN
3392     RDE:=Xpix;
3393     Rhl:=Ypix;
3394     USER(#bbf6);
3395   END;
3396
3400 PROCEDURE  SDUMP;
3420      VAR  Image : ARRAY [1..320] OF CHAR;
3440           Pixln, L,K,J,P1,P2,P3,P4,P5,P6,P7 : integer;
3460   BEGIN
3470    WRITELN(CHR(16));
3480        Pixln:=413;
3500        FOR K:=1 TO 28 DO
3520            BEGIN
3540              Pixln:=Pixln-14;
3560              FOR L:=1 TO 320 DO
3580                  BEGIN
3600                    P1:=TEST(L*2,Pixln);
3620                    P2:=TEST(L*2,Pixln-2)*2;
3640                    P3:=TEST(L*2,Pixln-4)*4;
3660                    P4:=TEST(L*2,Pixln-6)*8;
3680                    P5:=TEST(L*2,Pixln-8)*16;
3700                    P6:=TEST(L*2,Pixln-10)*32;
3720                    P7:=TEST(L*2,Pixln-12)*64;
3740                    Image[L]:=CHR(P1+P2+P3+P4+P5+P6+P7)
3760                  END;
3780              WRITELN(CHR(27),CHR(75),CHR(2),CHR(64));
3800              FOR J:=1 TO 320 DO
3801                  BEGIN
3802                    IF image[j]<>chr(16) THEN write(image[j])
3803                    ELSE write(chr(32));
3804                  END;
3805              WRITELN(chr(1));
3840           END;
3850         write(chr(16));
3870         write(chr(7));
3880   END;
3890
3900 PROCEDURE ESDUMP;
3920   VAR    Image : ARRAY[1..320] OF char;
3925          Pixln,l,k,j,P1,P2,P3,P4,P5,P6,P7 : INTEGER;
3930   BEGIN
3940     writeln(chr(16));
3950     write(chr(27),chr(65),chr(6));
3960   Pixln:=413;
3970   FOR k:=1 TO 28 DO
3980      BEGIN
3990        Pixln:=Pixln-14;
4000        FOR L:=1 TO 320 DO
4010          BEGIN
4020            P1:=TEST(l*2,Pixln)*64;
4030            P2:=TEST(l*2,Pixln-2)*32;
4040            P3:=TEST(l*2,Pixln-4)*16;
4050            P4:=TEST(l*2,Pixln-6)*8;
4060            P5:=TEST(l*2,Pixln-8)*4;
4070            P6:=TEST(l*2,Pixln-10)*2;
4080            P7:=TEST(l*2,Pixln-12);
4090            image[l]:=chr(P1+P2+P3+P4+P5+P6+P7);
4100          END;
4110        WRITEln(chr(27),chr(75),chr(66),chr(1));
4120        FOR j:=1 TO 320 DO
4130          BEGIN
4140            IF image[j]<>chr(16) THEN write(image[j])
4150            ELSE write(chr(32));
4160          END;
4170        writeln(chr(1));
4180      END;
4185      write(chr(27),chr(65),chr(12));
4190      write(chr(16));
4200      write(chr(7));
4210   END;
4220
4420 PROCEDURE DRAWBOX(Tlx,Tly,Brx,Bry  : INTEGER);
4440  BEGIN
4460    PLOT(Tlx,Tly);
4480    LINE(Brx,Tly);
4500    LINE(Brx,Bry);
4520    LINE(Tlx,Bry);
4540    LINE(Tlx,Tly);
4560  END;
4570
4580 PROCEDURE GOTOXY(x,y : INTEGER);
4600  BEGIN
```

```
4620      rh:=chr(x);
4630      rl:=chr(y);
4640      user(#bb75);
4660    END;
4662
4665 PROCEDURE SETINKS;
4666    BEGIN
4667      ra:=chr(0);
4668      rb:=chr(1);
4669      rc:=chr(1);
4670      user(#bc32);
4671      ra:=chr(1);
4672      rb:=chr(26);
4673      rc:=chr(26);
4674      user(#bc32);
4675      ra:=chr(1);
4676      user(#bb90);
4677      ra:=chr(0);
4678      user(#bb96);
4679    END;
4690
4700 PROCEDURE  START;
4720    VAR Ky: CHAR;
4740    BEGIN
4760       PAGE;
4780       DRAWBOX (20,380,620,20 );
4800       DRAWBOX (30,370,610,30 );
4820       GOTOXY ( 11  ,  10  );
4840       WRITE ('3D SURFACE PLOTTER');
4860       GOTOXY ( 8   ,  14 );
4880       WRITE('Press SPACE BAR to START');
4890       {$C-}
4900       REPEAT Ky:=INCH UNTIL Ky=CHR(32);
4910       {$C+}
4920    END;
4930
4940 PROCEDURE ENDPLOT;
4960    VAR OK: BOOLEAN;
4980        Ky: CHAR;
5000    BEGIN
5020        Exit:=FALSE;
5040        OK:=FALSE;
5060        REPEAT
5070           {$C-}
5080           REPEAT Ky:=INCH UNTIL Ky<>CHR(0);
5090           {$C+}
5100           IF (Ky='P') OR (Ky='p') THEN SDUMP;
5110           IF (Ky='e') OR (Ky='E') THEN ESDUMP;
5120           IF (Ky='X') OR (Ky='x') THEN Exit:=TRUE;
5140           IF (Ky='M') OR (Ky='m') THEN OK:=TRUE;
5160       UNTIL (OK=TRUE) OR (Exit = TRUE);
5180    END;
5190
5200 PROCEDURE  GETDET;
5220      LABEL 2,3,4,5,6;
5240      BEGIN
5260         PAGE;
5270         GOTOXY(1,21);
5271         WRITELN('When Plotting is complete PRESS -');
5272         WRITELN('M to Plot MORE  X to Exit Program');
5273         WRITE ('E to COPY to EPSONtype P to COPY to DMP1');
5274         GOTOXY(1,1);
5280         WRITE('ENTER PICTURE HEIGHT IN PIXELS');
5281         GOTOXY(1,2);
5282         WRITE('(min 20 max 400)');
5300 2:      GOTOXY (35,2); WRITE('      '); GOTOXY(35,2);
5340         READ(Height);
5360         IF (Height<20) OR (Height >400) THEN GOTO 2;
5380         GOTOXY (1,4);
5400         WRITE ('ENTER PICTURE WIDTH IN PIXELS');
5401         GOTOXY(1,5);
5402         WRITE('(min 20 Max 640)');
5420 3:      GOTOXY (35,5);
5440         WRITE ('     ');
5460         GOTOXY (35,5);
5500         READ(Wide);
5520         IF (Wide<20) OR (Wide >640) THEN GOTO 3;
5540         GOTOXY (1,7);
5560         WRITE ('ENTER DETAIL FACTOR (min 1 max 5)');
5580 4:      GOTOXY (35,7);
5600         WRITE ('      ');
5620         GOTOXY (35,7);
5660         READ(Detail);
5680         IF (Detail<1) OR (Detail >5) THEN GOTO 4;
5700         GOTOXY (1,9);
5720         WRITE ('ENTER DISTORTION FACTOR (min 0 max 99)');
5740 5:      GOTOXY (35,10);
5760         WRITE ('      ');
5780         GOTOXY (35,10);
5820         READ(Dist);
5840         IF (Dist<0) OR (Dist >99) THEN GOTO 5;
5860         GOTOXY (1,12);
5880         WRITE ('ENTER PERSPECTIVE FACTOR (min -99 max 99)');
5900 6:      GOTOXY (35,13);
5920         WRITE ('      ');
5940         GOTOXY (35,13);
5980         READ(Pers);
6000         IF (Pers<-99) OR (Pers>99)THEN GOTO 6;
6020    END;
6030
6040 PROCEDURE INITIALISE;
6060    BEGIN
6080       Halfwit:=Wide/2;
6100       Sqrwit:=Halfwit * Halfwit;
6120       Halfht:=Height/2;
6140       Qtrht:=Height/4;
6160       Compw:=320-Halfwit;
6180    END;
6190
6200 PROCEDURE PLOT3D;
6220    LABEL 1,10;
6240    BEGIN
6250    PAGE;
6260       L:=0;
6265       REPEAT
6300            Phi:=L*L;
6320            Theta:=Halfht;
6340            IF Sqrwit<Phi THEN GOTO 1;
6360            Sigma:=SQRT(Sqrwit-Phi);
6380            K:=-Sigma;
6400            REPEAT
6420              Rho:=SQRT(Phi+K*K)/Halfwit;
6440              Tau:=COS(Rho*EXP(Dist));
6460              Zeta:=K/Pers+Tau*Qtrht;
6480              IF Theta<Zeta THEN GOTO 10;
6520                 Theta:=Zeta;
6540                 Zeta:=Halfht-Zeta;
6560                 Xp:=Halfwit-L+Compw;
6580                 Yp:=Zeta;
6600                 Xpix:=TRUNC(Xp);
6620                 Ypix:=TRUNC(Yp);
6640                 PLOT(Xpix,Ypix);
6660                 Xp:=Halfwit+L+Compw;
6680                 Xpix:=TRUNC(Xp);
6700                 PLOT(Xpix,Ypix);
6720 10:                K:=K+Detail;
6740          UNTIL K>Sigma;
6745       L:=L+1;
6750       UNTIL L>Sqrwit;
6755       WRITE(CHR(7));
6760 1:  END;
6770
6780 { *****       MAIN PROGRAM       ******}
6800    BEGIN
6810       M:=1;
6820       mode(M);
6830       SETINKS;
6840       START;
6860       Exit:=FALSE;
6880       REPEAT
6900         GETDET;
6920         INITIALISE;
6940         PLOT3D;
6960         ENDPLOT;
6980       UNTIL Exit=TRUE;
7000    END.
7010
7020 {*****     END OF PROGRAM      *****}
```

ACU

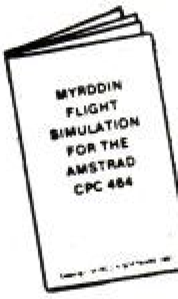


3D LANDMARKS YOU CAN FLY AROUND

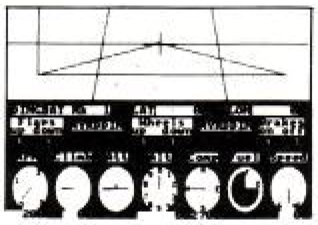
SUPERB REAL TIME SIMULATION

MYRDDIN FLIGHT SIMULATION

AMSTRAD CPC 464

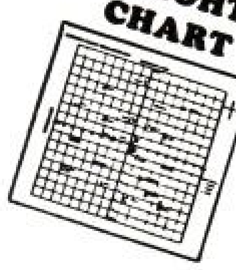


MANUAL

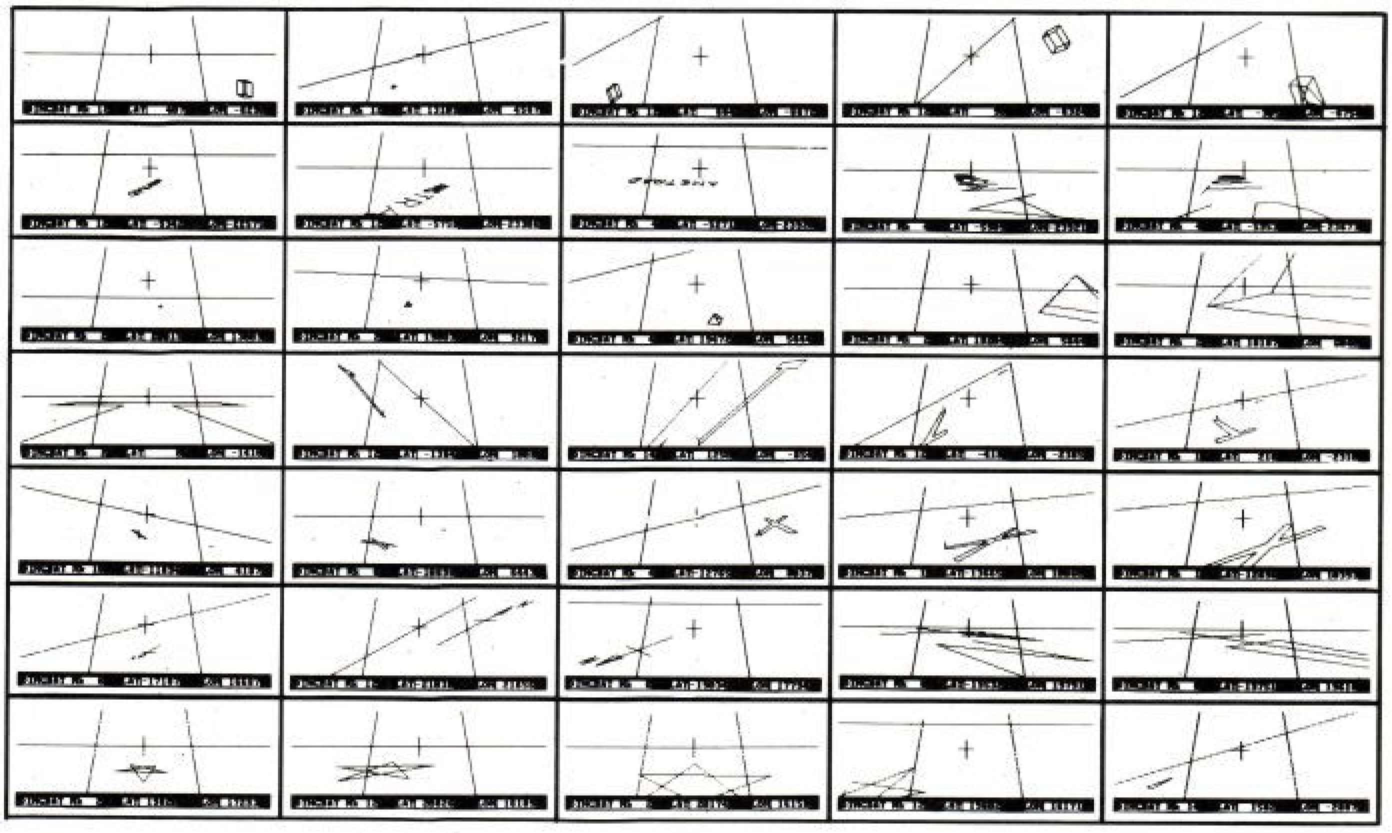


FULL SCREEN DISPLAY

FLIGHT CHART



Here are some screens from a typical flight showing the view from the cockpit (top half of screen) produced as printouts of the actual simulator.



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OR Telephone through your Access Order.

Signed..

QUICK ON THE DRAW ...?

Back in October, in Issue No.2, we enthused about DJL Software's SCREEN DESIGNER utility. Now, nine months on, we ask - is it really SO GOOD..? We've asked Jill Lawson, who has been 'playing around' with SCREEN DESIGNER for the past few months, to look at two new Art packages to see how they compare - and we also look at some of the beautiful pictures she has managed to coax out of the CPC464.

CRL Group's AMSTRAD ARTIST & SPRITE DESIGNER by Matthew Bradshaw

ARTIST, with a 16-page instruction booklet, promises all sorts of goodies in this 'highly advanced graphics package for the CPC464'.

On the box we are told that commands include:- PLOT, DRAW, CIRCLE, ELIPSE (sic), FILL, STIPPLE FILL, WASH, MIRROR, SCROLL (4 directions), INK CHANGE, ENLARGE, ERASE, BOX FILL, BOX, BLOCK MOVE and many others.

I could hardly wait...

It seemed like a good idea to have a look at the three demo screens included with the program, but here I hit a snag. A couple of goes resulted in 'read error b' for demo screen 1, and after a corrupted loading of demo screen 2, I gave up and plunged straight in to the program proper.

Two single pixel cursors control most of the operations --the first flashes red/ yellow, the second flickers green. These were easy enough to see against the original black background but can almost disappear when working over areas that have already been FILLed. I had hoped that ENLARGE was a facility to magnify a selected area of the screen but, in fact, this refers to making a given row double height. Pity!

Circles and ellipses are drawn by positioning the flashing cursor and entering the radii. Ellipses are restricted to those with horizontal or vertical axes. Spokes can be added to both circles and ellipses by re-entering radii and number of spokes required. Boxes are easily drawn with the two cursors at opposite ends of a diagonal, either in outline or FILLed. These FILL quite quickly but the area FILL is just about the most inefficient and frustrating that I have encountered - to be fair, the manual does warn that many 'fills' may be required - but a dozen or more to complete the space between two concentric circles? The STIPPLE FILL is a nice idea but always it seems to miss some bits in all but simple rectangles, so 'tidying up' could be a considerable strain on the eyes. Neither of these functions will work if the area to be filled is INKed already.

PLOTing is straightforward though tedious, controlled by the cursor keys so that accurate diagonal movement is difficult, though I'm sure this would improve with practice. Two kinds of dotted lines can be PLOTed by holding down SHIFT or CTRL. LINE drawing is the simplest function -just move the green cursor to the starting point, move the flashing cursor to the other end and ... bingo!

Either E or DEL will delete the last operation, but there is no UNPLOT so it can be time-consuming removing unwanted areas of a drawing (you could use those filled boxes of course...)

Current INK colour is shown at the foot of the screen, and stepping through the range with the space bar is easy. Ink colours can be changed but beware. I like to work on a light background so I interchanged black and grey since there is no ALTER PAPER COLOUR command, and when re-loaded, guess what had happened! OK, I changed them back, but what a bind. INKs can be set to flash too, if required. A WASH will change a given colour within a box -useful, if done with care.

SCROLLing is possible horizontally in 4-pixel jumps (with wrap) and vertically 8-pixels at a time (without wrap). A nice feature is the BLOCK MOVE where the area in a box can be reproduced elsewhere on screen without affecting the original.

The whole screen can be MIRRORed horizontally or vertically but this is a very slow operation and if you have nothing drawn near the edge of the screen you may think nothing is happening at first since it changes one line at a time.

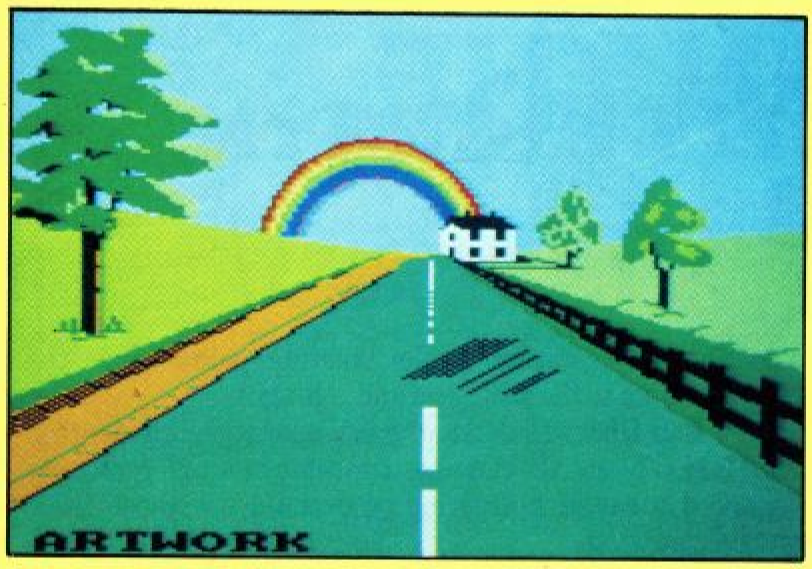
A range of Special Functions include circles drawn at various speeds (why?), an assortment of polygons (some with very suspect points) and a series of leaning triangles. Transparent/non-transparent User Defined Graphics may be designed and added - handy if you want a lot of something in your picture (people, ladders bricks, trees...) If you want text in your picture you'll have to use the UDGs to design that too.

At this point I had hoped to astound you with a picture of a Model T Ford (with all those ellipses with spokes!) but I stopped halfway and couldn't manage to reload my drawing into ARTIST.

CONCLUSION

There was much that was good in this program - lots of interesting features, but I did have the feeling, especially with the Special section, that it was a case of 'bung it all in regardless'. If you want to have a lot of fun creating screen designs, especially based on machinery, spaceships, cars, and are not too fussy about being accurate to the last pixel, all you ex-Speccy owners could delightin the kind of pictures you can produce with AMSTRAD ARTIST on the CPC464, but without a MAGNIFY option, with no UNPLOT and that diabolical FILL, this is not a program for the serious screen artist.

(I was going to comment briefly on the SPRITE DESIGNER on the other side of the tape but I haven't managed to load it successfully yet!)



ARTWORK from Kuma Computers Ltd. by D. Mendes and M. O'Neill

ARTWORK, with 20 pages of instructions (and a HELP facility within the program accessable while working) will enable you to draw pictures using sophisticated CIRCLE, ELLIPSE, LINE and BOX drawing facilities....(in) all available screen modes and colours....includes FAST COLOUR FILL, complete SCREEN SCROLL (all directions)....SAVE and LOAD....to tape and disc.

I had no problems loading the program and the single Demo-screen - a rather nice black and white urban scene, drawn in Mode 2.

A single-pixel cursor (with four surrounding dots to aid its location) is moved with the cursor keys, gathering speed as long as a key is pressed. Holding down SHIFT with these keys enables PLOTing. LINE drawing is easy, with a 'rubber-band' effect allowing accurate positioning before the line is drawn. Similarly, boxes, circles and ellipses can be seen before they are drawn in, and can be altered in size (and shape in the case of boxes and ellipses) at this point. Also, ellipses may be rotated - a particularly attractive feature of ARTWORK. A box may also be used to clear the area within it with a single key press.

INK selection is simple, with the current colours available summoned by pressing the COPY key. Move the cursor into the desired colour and...hey presto! Back-grounds are changed equally easily, and any ink may be changed to one not currently available. Although there is no actual UNPLOT, rectifying mistakes can be done quickly in several ways, so this is not too much of a problem.

Text can be added to the picture and can be moved around before deciding on the final position. At any time the screen can be scrolled in any direction.

I've probably saved the best feature till last - the FILL facility is FAST and will fill anything but single diagonal pixels in one operation...SOO-PERB!

Unfortunately it is not possible to add User Defined Graphics, and there is no MAGNIFY function for drawing fine detail.

CONCLUSION

ARTWORK, with its 'see it before you do it' principle, is very pleasant to use. Circles, ellipses, boxes, lines could all be positioned accurately and although I sometimes found the cursor a little 'flighty' when trying to pin it down to a single pixel, control became easier with use. The absence of a UDG facility may prove a drawback, though I could live quite happily without it. With the fast-moving cursor and rapid, extremely efficient FILL, this program really grows on you when you find you can create simple screen designs in half the time it took with ARTIST. Usable in all three screen modes, I could have been very tempted to change to ARTWORK but for one fact..... with no MAGNIFY it would be almost impossible to achieve the single-pixel plotting necessary for a real 'painting', especially in hi-res modes.

ARTWORK would be most suitable for the draughtsman who wants to produce good results quickly and easily, with not too much fine detail (unless your eyesight is much better than mine).



SCREEN DESIGNER from Amsoft

SCREEN DESIGNER, with 21 pages of simple step-by-step instructions, 'is a multi-feature Graphics Design utility..... to create impressive picture screens'.

It offers:-MODE SELECTION, COLOUR SET SELECTION, PIXEL PLOT, PIXEL UNPLOT, LINE DRAWING, CIRCLE, FILL, LARGE CURSOR PLOT, TEXT PRINT, TEXT MERGE, WASH, STIPPLE CHARACTER PRINT, GRAPHICS STORE/PRINT, SCREEN SCROLL (PIXEL OR CHARACTER), MAGNIFICATION (x4 AND x16), SAVE/LOAD SCREEN, SAVE/ LOAD GRAPHICS and CASSETTE/DISC OPERATION.

A single-pixel cursor is moved around the screen with all but the '5' key on the numeric keypad, giving accurate diagonal movement. Used with the SHIFT key, the cursor moves in 8-pixel jumps. PLOTing and UNPLOTing are straightforward, and a change of PEN or PAPER colour is easily made. The available colour set can be altered at will any time during drawing, and colours can be set to flash at a chosen rate.

An information window at the top/bottom of the screen, and removeable to view the whole picture, displays current information regarding mode, pen and paper colours, magnification and area of screen displayed.

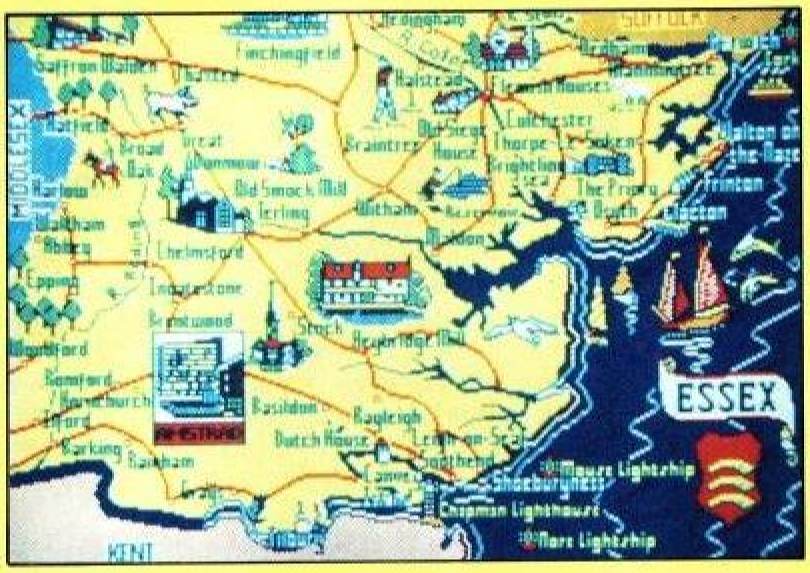
LINEs can be drawn from the last point PLOTed. CIRCLE drawing is one of this program's weaker features. A point is PLOTed then the cursor must be moved to a place on the proposed circumference. You are asked if you wish to draw the circle, but once done you are stuck with it (a DELETE LAST OPERATION would have been nice here). Area FILL

is much slower than in ARTWORK but efficient. You can abort during the FILL, but beware - once completed, there is no UNFILL option. SCROLL-ing, with wrap, is available in either single-pixel or 8-pixel steps. The area of work can be magnified either 4 or 16 times!

TEXT MODE allows transparent/non-transparent text printing positioned with one-pixel accuracy. All keyboard characters are available, plus a variety of 'block graphics' from the numeric keypad. Big-area PLOT and UNPLOT are included in the TEXT mode - very useful for erasing unwanted areas!

STIPPLE MODE will print eleven assorted stippled characters - these can be 'merged' with the background if required. The stipple effect is particularly useful in the 4-colour mode - giving a total of 10 colours or shades.

26 GRAPHICS can be stored by 'picking up' an area under the cursor. WASH enables change of one colour or all-but-one colour with the large cursor. DELETE is possible in TEXT MODE, but not after a return from the screen editor. The screen can be CLEARed only in screen select mode, to avoid accidental loss of the picture.

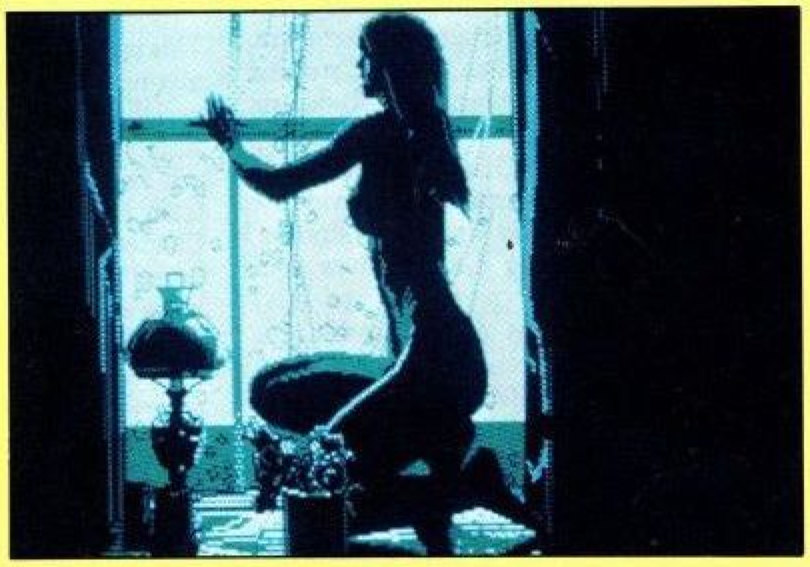


CONCLUSION

SCREEN DESIGNER is a very easy program to use, with everything explained very clearly in the manual. Unlike the other two utilities, it does not offer boxes, ellipses and suchlike (though if you must have ellipses you can always find ways to draw them) and there would be some room for improvement in the areas I have mentioned (CIRCLE and FILL). However I have found nothing in this program to cause any high degree of dissatisfaction.

The outstanding feature, and the one which will ensure that I stay with SCREEN DESIGNER (at least until there is an ARTWORK PLUS....) is the ability to MAGNIFY the area of screen in which I am working either by 4 for correct positioning of the cursor or by 16 for dealing with the really tricky bits. Flipping between normal and enlarged views enables easy positioning of single pixels where mis-placement of even one could, for instance, completely change the expression on a face, and permits amazing effects with colour mixing in each tiny area of the picture.

SCREEN DESIGNER is best suited to the artist who has the confidence to draw free -hand and wants to produce pictures with lots of fine detail



COMPUTER ART - THE 'REMBRANTS' OF THE FUTURE....?

With the limitations imposed by the number of pixels which make up the total screen area, resolution would have to be much finer before 'computer art' could really be compared to, say, oil-painting (a closer analogy would be to carpet design or tapestry work), but those same limittions can represent a challenge which has often found me still at the CPC464 at three in the morning! If you haven't tried it yet, why not give it a try - but, be warned, it can become entirely addictive.

	AMSTRAD ARTIST	ARTWORK	SCREEN DESIGNER
EASE OF USE	★★★★★	★★★★★ ★★★★	★★★★★ ★★★★★
SPEED	★★	★★★★★ ★★★★★	★★★★★ ★★
SPECIAL FEATURES	★★★★★ ★★★★★	★★★★★ ★★★	★★★★★ ★★
ARTISTIC POTENTIAL	★★★★	★★★★★ ★★	★★★★★ ★★★★★
OVERALL ASSESMENT	★★★★★	★★★★★ ★★★	★★★★★ ★★★
PRICE	£ 9.95	£ 9.95	£14.95

ACU

MACHINE CODE MOZART

Part 1 (1 of 3) of m/c use of the AY-3-8912 chip

Richard Sargent

If you've been following the articles on the Muscial Amstrad published in these pages recently, you will already know that the CPC has stereo sound in three channels, and that a comprehensive set of BASIC commands allow sound the music creations to be added to any program. There are, however, occasions when the CPC's sound chip needs to be run from machine code, and to do so requires rather more information than the standard CPC handbook contains.

The purpose of this article is to provide the extra information. By way of illustration, this month's offering describes how your computer can be persuaded to play unlimited quantities of Mozart-minuets. Each minuet is different and you won't hear one repeated in a lifetime. This program, which requires no musical skill whatsoever on the party of the user, will be discussed in some detail later.

The sound chip used inside the CPC464 is the AY-3-8912 from General Instruments and it's generally referred to as a PSG (Programmable Sound Generator). If you have the Amstrad Firmware Manual SOFT 158, then you might already know that this IC has fifteen internal registers (see Appendix 9). This is an early indication of the complexity of the chip and, as the firmware manual suggests for detailed machine code work involving this chip you should get a copy of the manufacturer's chip-specification, which is a 60-page booklet rejoicing in the name "AY-3-8910 /8912 PROGRAMMABLE SOUND GENERATOR DATA MANUAL". It costs about £3.

The registers set is shown in figure 1. For the Mozart program, registers 8,9 and 10 can be set to full volume and then safely forgotten, since the Amstrad has its own volume control. Register 7 is set for TONE output rather than NOISE output, and it is the FREQUENCY registers, 0 to 5 which contrive the hard work of actually sounding the notes. The other registers are not used in this month's application, but I shall be return to them in Part Two.

The Amplitude Registers

There are three identical 5-bit registers, one for each sound channel. Bit 4 is used in conjunction with the envelope facilities which the chip offers. These are unused and so bit 4 should be set to zero. Bits 0 to 3 hold a 15-scale amplitude level. 0 turns a channel off, while 15 is full volume.

Control Register Seven

This is an 8-bit register which has the job of mixing sound and also setting the peripheral port which the PSG possesses. A zero bit is taken to mean ON, and the bits are used as switches, B0 for channel one tone, B1 for channel two tone and so on. Channel noise is switched, the noise is mixed with it. Note that there is only one noise source (register 6), but that it can be sent to any of the channels. Bit 6 sets the peripheral port as an input (B6=0), otherwise the keyboard stops working. This will not harm the machine, but a total RESET will have to be made to unlock the system.

Fig. 1

The sound chip data registers are as follows:

Register 0:	Channel A tone period fine tune.
Register 1:	Channel A tone period coarse tune.
Register 2:	Channel B tone period fine tune.
Register 3:	Channel B tone period coarse tune.
Register 4:	Channel C tone period fine tune.
Register 5:	Channel C tone period coarse tune.
Register 6:	Noise period.
Register 7:	Enables and I/O direction.
Register 8:	Channel A amplitude and envelope enable.
Register 9:	Channel B amplitude and envelope enable.
Register 10:	Channel C amplitude and envelope enable.
Register 11:	Envelope period fine tune.
Register 12:	Envelope period coarse tune.
Register 13:	Envelope shape.
Register 14:	Input from or output to port A.
Register 15:	Not used.

The Frequency Registers

Each sound channel has a double register allocated to it since a 12-bit number is required to set the TONE PERIOD. A high number sets a long period and long periods produce low notes, so the higher the number, the lower the frequency of the note. There is an equation which creates a number between 0 and 4095 which, when loaded into the registers, produces the desired frequency.

$$\text{NUMBER} = \frac{\text{PSGCLOCK}}{\text{FREQUENCY}*16}$$

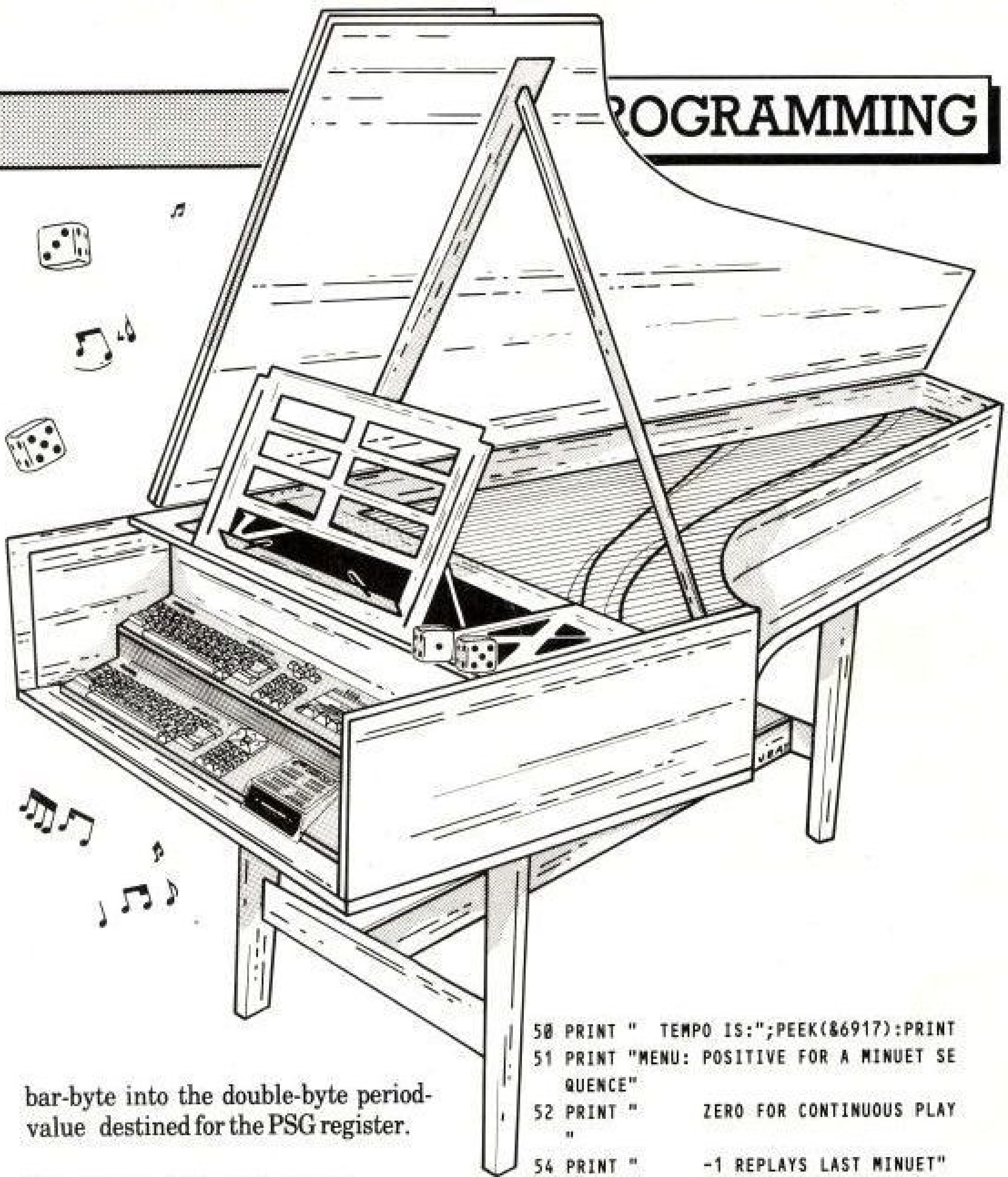
It is convenient to let a BASIC program do the maths involved, which includes splitting the 12-bit number produced into a least-signficant byte and a most-significant byte ready for loading into the appropriate PSG register pair.

```
10 INPUT "FREQUENCY ";F
20 N=125000/F
30 PRINT "LSB ";N-256*INT (N/256)
40 PRINT "MSB ";INT (N/256):GOTO 10
```

Alternatively N may be taken from the TONE PERIOD table in the CPC464 manuals. Thus, in the user instructions booklet (Appendix VII), International A is listed as having a frequency of 440Hz and a tone period of 284. The firmware manual takes us a little further by listing the period number in hex : it's 011C. Hex numbers split naturally into bytes, so to load channel one with a frequency of 440Hz, 10 is loaded into register one and 01 into register two. This brings us to the problem of how to load a PSG register.

Hard and Soft Sounds

The PSG is a programmable hardware device, and as such it is capable of producing a wealth of sound just by changing the information in some of its registers. Some software is required to do this, but it is essentially a hardware sound-production unit. What Locomotive BASIC provides is an added dimension of control based on complicated routines and interrupt -handling in the SOUND MANAGER part of the ROM. Thus software considerably enhances the PSG hardware and the end result is very good. It is possible to access the PSG and all its registers directly, but there is little point in doing so since the ROM routine MC SOUND REGISTER at &BD34 provides the necessary software interface. The number of the register you want to access is placed in the A register and the data you wish to load is put in the C register. A CALL &BD34 then performs the load. Registers AF and BC are corrupted but the contents of the others are preserved. The routine also enables interrupts which might be undesirable in certain circumstances. The Mozart program runs with interrupts switched off for most of the time, but in fact the quality of sound with interrupts, enabled seemed little the



worse for all that --- the PSG carries on regardless, and timing between notes is hardly affected.

Enter Mozart

Sometime in the 18th century, Mozart indulged in a piece of musical fun which was of little significance before the advent of the computer. He wrote 176 carefully constructed bars of music, each bar on a separate manuscript, in such a way that when 16 bars were randomly selected from the "bar bank" and played in sequence, a pleasant sounding minuet would result. In pre-Amstrad days the selection of the 16 bars was determined by two dice and a look-up table. The manuscipts were then placed on a harpsichord, secured by wooden clips. Since each minuet takes only 60 seconds to play, the musical evening must have been somewhat fragmented.

Computers like dealing with dice (random numbers), and look-up tables are the programmer's stock-in-trade. Not surprisingly therefore, Mozart's Dice Waltz was computerised as soon as home-micros became anywhere near affordable, and honours go to the Apple which had Mozart playing away merrily on TV's Tomorrow's World at a time when there were no British home computers to be bought for either love or money. The CPC464 can be set to play the Dice Waltz for ever, since there are literally thousands of millions of combinations of the 176 musical bars...

Fortunately ESCape will terminate the computer's efforts.

Think of Number...

Each of Mozart's manuscipt-bars had a reference number attached to it, and these numbers were arranged in a table 11 rows deep and 16 columns wide. 16 throws of the dice were made, one throw for each column, and the number thrown indicated which row (for the current column) should produce the manuscript reference number. Mozart had, of course, arranged the table so that the 16 bars selected would conform to certain accepted rules pertaining to the particular style of music. The last 8 columns of music, 88 bars in all, were arranged to complement the first 88 bars and special attention was given to the notes in columns 1 and 16, the first and the last bars. A dice-throwing session thus provided a unique 16-bar piece of music. The first 8 bars were always repeated, as were the last 8 bars, giving a 32-bar minuet. The minuets should be played in three-eight time.

As far as the computer is concerned there are 6 beats in the bar. At every beat 3 bytes of information must be supplied -- one byte for each channel of the PSG. A bar uses 18 bytes, so the table of 176 bars is nearly 3K in length. Each byte represents one of 51 notes, or a rest (silence), and there are shorter look-up tables which translate the bar-byte into the double-byte period-value destined for the PSG register.

Getting Running.

Next month we will print the source code so that you can see how the machine code works. Since not everyone has an assembler we have printed the program "Listing 1" this generates the machine code which is used by the Basic program. If you have a disc system then using the two programs is nice and simple. Type in the long listing 1, save it and then run it. Reset the computer, type in the shorter Basic program and save it. Finally run the short Basic program which will then load a file which was put onto the disc by the long Basic program. For tape users it is even more complicated. Type in both programs and save them on seperate tapes. Wind the tape with the short program to the end of the program. Then take the tape with the long program. Load it but don't run it yet. Swap the tape for the one with the short program on the beginning. Then run the program you have in memory. This will create the machine code in the right place on the tape. If you make any typing mistakes the long program should tell you about them and give an indication as to which line the mistake is in or close to.

Basic program. This loads the machine code file 'CODEP1' which must be saved on the same tape or disc.

```
1 GOTO 9000
8 MODE 2:CLS
10 PRINT "  MOZART":PRINT
48 PRINT "  PERIOD NUMBERS:";PEEK(&6782)
   +PEEK(&6783)*256;
49 PRINT " AND";PEEK(&67EA)+PEEK(&67EB)*
   256
50 PRINT "  TEMPO IS:";PEEK(&6917):PRINT
51 PRINT "MENU: POSITIVE FOR A MINUET SE
   QUENCE"
52 PRINT "      ZERO FOR CONTINUOUS PLAY
   "
54 PRINT "      -1 REPLAYS LAST MINUET"
56 PRINT "      -2 TO ALTER THE TEMPO"
57 PRINT "      -3 TO ALTER THE KEY"
58 PRINT "      -4 CONTINUOUS DUAL OCTAV
   E"
59 PRINT "      ESC TERMINATES"
60 PRINT STRING$(80,"-")
64 INPUT "MENU NUMBER";N
65 IF N=0 THEN GOTO 340
80 IF N=-1 THEN GOSUB 500:GOTO 48
82 IF N=-2 THEN GOTO 300
83 IF N=-3 THEN GOTO 1000
84 IF N=-4 THEN GOTO 480
100 FOR X=1 TO N:CALL &6900:PRINT:NEXT X
110 GOTO 48
300 PRINT: PRINT "SELECT TEMPO 126-255":
    INPUT N
310 IF N<126 OR N>255 THEN GOTO 300
320 POKE &6917,N:GOTO 48
340 PRINT:CALL &6900:GOTO 340
480 GOSUB 9006:GOTO 480
499 STOP
500 Y=&6934
510 FOR X=&6924 TO &6933
520 POKE Y,PEEK(X):Y=Y+1:NEXT X
530 CALL &6902:RETURN
1000 CLS:PRINT "ALTER THE NOTE TABLE"
1010 PRINT "TABLE 1 OR 2 ?":INPUT N
1011 PRINT "C  C# D  D# E  F  F# G  G# A
       A# B  C  C# D  D# E  F  F# G  G#"
     ;
1012 PRINT " A  A# B  C"
1015 PRINT "1  2  3  4  5  6  7  8  9  1
     0 11 12 13 14 15 16 17 18 19 20 21"
     ;
1016 PRINT " 22 23 24 25"
1017 PRINT:INPUT "START 1-25";F:IF F>25
     THEN GOTO 1013
1018 GOSUB 1022:GOTO 48
1022 RESTORE 2000
1023 FOR X=1 TO F:READ Z:NEXT X
1024 IF N=1 THEN S=&6782 ELSE S=&67EA
1025 IF N=1 THEN E=&67E7 ELSE E=&684F
```

```
1050 FOR X=S TO E STEP 2
1060 READ N
1070 POKE X,N-(INT(N/256)*256):POKE X+1,
     INT(N/256):NEXT X
1080 RETURN
2000 DATA 0,1911,1804,1703,1607,1517,143
     2,1351,1276,1204,1136,1073,1012
2012 DATA 956,902,851,804,758,716,676,63
     8,602,568,536,506
2020 DATA 478,451,426,402,379,358,338,31
     9,301,284,268,253
2030 DATA 239,225,213,201,190,179,169,15
     9,150,142,134,127
2040 DATA 119,113,106,100,95,89,84,80,75
     ,71,67,63,60,56,53
2050 DATA 50,47,45,42,40,38,36,34,32,30,
     28,27,25,24,22
9000 MEMORY &5C00:LOAD "CODEP1"
9001 MODE 2:CLS:PRINT "4-TUNE DEMO":PRIN
     T
9002 GOSUB 9005:GOTO 10
9005 POKE &6917,190
9006 N=1:F=22:GOSUB 1022:N=2:F=24:GOSUB
     1022:PRINT
9008 CALL &6900:PRINT:CALL &6900
9009 N=1:F=10:GOSUB 1022:N=2:F=12:GOSUB
     1022:PRINT
9010 CALL &6900:PRINT:CALL &6900:PRINT:R
     ETURN
9100 SAVE "MOZ1":SAVE "CODEP1",B,&5DC5,3
     232,&5DC5:STOP
```

If you do not have an assembler you can use this program to make the machine code program. This saves the file 'CODEP1'

```
10 'Listing 1
20 'save this program BEFORE running
30 MEMORY &5DC4
40 MODE 2:PRINT"This will take some time
   . Working on line:":PRINT
100 ln=1010:valid$="0123456789ABCDEF"
120 FOR x=&5DC5 TO &5DC5+3232 STEP 8
130 FOR y=0 TO 7
140 READ a$
142 FOR n=1 TO LEN(valid$):IF LEFT$(a$,1
    )<>MID$(valid$,n,1) THEN NEXT:GOTO 2
    00
144 FOR n=1 TO LEN(valid$):IF RIGHT$(a$,
    1)<>MID$(valid$,n,1) THEN NEXT:GOTO
    200
150 a=VAL("&"+a$):total=total+a:POKE x+y
    ,a
160 NEXT:PRINT CHR$(11);ln:READ chk:IF c
    hk<>total THEN 300
170 ln=ln+10
190 total=0:NEXT
191 PRINT"All Data Ok. Now saving the ma
    chine code program 'CODEP1'"
195 SAVE"codep1",b,&5DC5,3232,&5DC5
199 PRINT"Machine Code Saved. Now reset
    the Computer":END
200 PRINT"Non-Valid Character in line";l
    n;" Please Check
210 STOP
300 PRINT"Error in Data in line";ln
310 STOP
1010 DATA 1B,03,13,00,3E,2A,00,12, 171
1020 DATA 2A,00,12,27,00,0F,27,00, 153
1030 DATA 0F,2C,00,14,2C,00,14,22, 177
1040 DATA 14,0C,22,14,0C,1F,14,0C, 161
1050 DATA 20,14,0C,24,00,00,2C,00, 144
1060 DATA 00,2C,11,0D,2C,11,0D,25, 185
1070 DATA 11,0D,25,11,0D,29,00,00, 138
1080 DATA 29,00,00,2C,00,08,2C,00, 137
1090 DATA 0C,27,00,14,29,00,14,27, 171
1100 DATA 00,0C,29,00,0C,2C,27,08, 156
1110 DATA 2C,27,08,2C,18,14,2C,00, 223
1120 DATA 12,00,14,11,00,00,0F,20, 102
1130 DATA 11,0D,20,11,0D,25,11,0D, 159
1140 DATA 25,11,0D,29,00,00,29,00, 149
1150 DATA 00,29,14,0D,25,14,0D,29, 185
1160 DATA 14,0D,2C,14,0D,31,00,00, 159
1170 DATA 2C,00,00,25,00,0D,25,00, 131
1180 DATA 0D,25,00,08,25,00,08,00, 103
1190 DATA 00,01,00,00,01,29,25,14, 100
1200 DATA 29,25,14,27,24,14,27,24, 268
1210 DATA 14,00,00,08,00,00,08,24, 72
1220 DATA 00,14,22,00,14,24,00,14, 130
1230 DATA 25,00,14,27,00,00,24,00, 132
1240 DATA 00,29,00,0D,25,00,0D,24, 140
1250 DATA 00,0F,22,00,0F,20,00,03, 99
1260 DATA 1F,00,03,25,1D,0D,25,00, 150
1270 DATA 00,25,1D,0D,25,00,00,25, 153
1280 DATA 1D,0D,25,00,00,25,14,0D, 149
1290 DATA 25,14,0D,20,14,0D,20,14, 187
1300 DATA 0D,1D,00,00,1D,00,00,29, 112
1310 DATA 14,0D,29,14,0D,2C,14,0D, 184
1320 DATA 29,14,0D,25,11,0D,25,11, 195
1330 DATA 0D,2E,13,0F,2E,13,0F,2B, 216
1340 DATA 13,0F,2B,13,0F,27,13,0D, 182
1350 DATA 27,13,0D,25,14,11,20,14, 197
1360 DATA 11,25,14,11,29,14,11,20, 201
1370 DATA 00,00,25,00,00,20,11,0D, 99
1380 DATA 20,11,0D,25,11,0D,25,11, 183
1390 DATA 0D,29,14,0D,29,14,0D,29, 202
1400 DATA 14,0D,25,14,0D,29,14,0D, 177
1410 DATA 29,14,0D,2C,11,0D,2C,11, 209
1420 DATA 0D,2C,00,0C,2C,00,0C,30, 173
1430 DATA 00,0C,33,00,0C,27,06,00, 120
1440 DATA 27,00,00,25,00,0D,29,00, 130
1450 DATA 0D,2C,00,0F,27,00,0F,22, 160
1460 DATA 00,03,2B,00,03,29,00,0D, 103
1470 DATA 29,00,0D,25,00,0D,25,00, 141
1480 DATA 0D,20,00,00,20,00,00,2A, 119
1490 DATA 00,12,29,00,11,27,00,0F, 130
1500 DATA 29,00,11,2A,00,12,2C,00, 162
1510 DATA 14,1B,00,0F,1F,00,0F,22, 142
1520 DATA 00,0F,27,00,0F,2B,00,0D, 125
1530 DATA 2E,00,0D,29,25,0D,29,25, 228
1540 DATA 11,25,29,14,25,29,11,29, 251
1550 DATA 25,19,29,25,0D,2A,18,14, 239
1560 DATA 29,18,14,2A,18,14,27,18, 234
1570 DATA 14,25,00,00,24,00,00,2B, 136
1580 DATA 16,0D,27,16,0D,22,16,0D, 178
1590 DATA 2E,16,0D,2B,00,00,27,00, 163
1600 DATA 00,24,00,14,27,00,14,2C, 159
1610 DATA 00,14,27,00,14,24,00,08, 123
1620 DATA 24,00,08,29,14,0D,25,14, 175
1630 DATA 0D,20,14,0D,20,14,0D,29, 184
1640 DATA 0D,14,29,0D,14,2C,08,08, 167
1650 DATA 2C,08,08,2C,18,14,2C,14, 212
1660 DATA 12,00,13,11,00,11,0F,29, 127
1670 DATA 00,14,25,00,14,27,00,14, 136
1680 DATA 24,00,14,20,00,00,20,00, 120
1690 DATA 00,22,13,0F,22,13,0F,27, 175
1700 DATA 13,0F,27,13,0F,2B,16,0D, 185
1710 DATA 2B,16,0D,22,00,0D,29,00, 166
1720 DATA 0D,27,00,0F,2C,00,0F,2B, 169
1730 DATA 00,03,2E,00,03,2C,0F,0C, 123
1740 DATA 30,0F,0C,2C,0F,0C,27,0F, 200
1750 DATA 0C,24,00,00,24,00,00,25, 121
1760 DATA 11,0D,25,14,0D,20,11,0D, 162
1770 DATA 20,14,0D,29,11,0D,29,14, 197
1780 DATA 0D,00,2C,0C,00,2C,0F,20, 160
1790 DATA 00,14,20,00,0F,00,20,0C, 111
1800 DATA 00,20,08,25,11,0D,24,11, 160
1810 DATA 0D,25,11,0D,29,11,0D,20, 183
1820 DATA 00,00,25,00,00,25,11,0D, 104
1830 DATA 24,11,0D,25,11,0D,29,11, 191
1840 DATA 0D,20,00,00,20,00,00,24, 113
1850 DATA 00,08,25,00,08,27,00,08, 100
1860 DATA 24,00,08,22,00,00,20,00, 110
1870 DATA 00,2C,11,0D,2C,11,0D,2A, 190
1880 DATA 11,0D,29,11,0D,27,00,00, 140
1890 DATA 25,00,00,22,00,12,22,00, 123
1900 DATA 12,2A,00,12,27,00,12,22, 169
1910 DATA 00,14,24,00,14,25,14,11, 150
1920 DATA 24,14,11,25,14,11,20,14, 199
1930 DATA 11,1D,00,00,19,00,00,2C, 115
1940 DATA 0F,0C,2C,0F,0C,30,0F,0C, 173
1950 DATA 2C,0F,0C,27,00,00,24,00, 146
1960 DATA 00,2C,0F,0C,2C,0F,0C,2C, 186
1970 DATA 0F,0C,27,0F,0C,30,00,00, 141
1980 DATA 30,00,00,29,14,0D,29,14, 183
1990 DATA 0D,25,14,0D,29,14,0D,2C, 201
2000 DATA 0D,11,31,0D,11,29,11,0D, 180
2010 DATA 29,14,0D,25,11,0D,25,14, 198
2020 DATA 0D,20,11,0D,20,14,0D,25, 177
2030 DATA 14,11,25,14,11,29,14,11, 189
2040 DATA 25,14,11,20,00,00,20,00, 138
2050 DATA 00,25,11,0D,20,11,0D,29, 170
2060 DATA 11,0D,25,11,0D,2C,00,00, 141
2070 DATA 29,00,00,27,00,12,26,00, 136
2080 DATA 12,27,00,12,2A,00,12,20, 167
2090 DATA 00,14,24,00,14,29,25,0D, 167
2100 DATA 29,25,0D,25,29,0D,2A,27, 263
2110 DATA 0D,2C,29,00,2C,29,00,2C, 227
2120 DATA 0F,0C,2C,0F,0C,30,0F,0C, 173
2130 DATA 30,0F,0C,27,00,00,27,00, 153
2140 DATA 00,27,14,08,24,14,08,20, 163
2150 DATA 14,08,20,14,08,00,00,14, 108
2160 DATA 00,00,14,2C,11,0D,2C,14, 158
2170 DATA 0D,29,11,0D,29,14,0D,25, 195
2180 DATA 11,0D,25,14,0D,2C,11,0D, 174
2190 DATA 2C,14,0D,25,11,0D,25,14, 201
2200 DATA 0D,29,11,0D,29,14,0D,25, 195
2210 DATA 14,11,25,14,11,29,14,11, 189
2220 DATA 25,14,11,2C,00,00,2C,00, 162
2230 DATA 00,29,00,0D,25,00,0D,24, 140
2240 DATA 00,0F,20,00,0F,22,00,03, 99
2250 DATA 1F,00,03,29,00,0D,25,00, 125
2260 DATA 0D,24,00,0D,25,00,0D,20, 144
2270 DATA 00,00,20,00,00,29,14,0D, 106
2280 DATA 2C,14,0D,31,14,0D,2C,14, 223
2290 DATA 0D,29,0D,14,25,0D,14,27, 196
2300 DATA 12,0F,22,12,0F,27,12,0F, 172
2310 DATA 27,12,0F,2B,00,00,2B,00, 158
2320 DATA 00,2B,16,0F,2B,16,0F,2E, 206
2330 DATA 0F,13,2E,0F,13,2B,0D,0F, 185
2340 DATA 2B,0D,0F,25,11,0D,24,11, 191
2350 DATA 0D,25,11,0D,29,11,0D,20, 183
2360 DATA 14,11,25,14,11,2C,00,0C, 167
2370 DATA 2C,00,0C,30,00,0C,2C,00, 160
2380 DATA 0C,27,00,00,2C,00,00,2C, 139
2390 DATA 11,0D,2C,11,0D,29,11,0D, 175
2400 DATA 29,11,0D,25,00,00,25,00, 145
2410 DATA 00,2B,00,0F,2B,00,0F,2E, 162
2420 DATA 00,0F,2B,00,0F,27,00,0D, 125
2430 DATA 2B,00,0D,2C,0F,0C,30,0F, 190
2440 DATA 0C,33,0F,0C,30,0F,0C,2C, 209
2450 DATA 0C,0F,2C,0C,0F,2A,00,12, 158
2460 DATA 29,00,12,27,00,12,25,00, 153
2470 DATA 12,24,00,14,27,00,14,31, 182
2480 DATA 11,0D,30,11,0D,31,11,0D, 187
2490 DATA 2C,11,0D,29,00,00,25,00, 152
2500 DATA 00,2B,27,0D,2B,27,0D,27, 229
2510 DATA 2B,00,27,2B,00,2B,27,0D, 220
2520 DATA 2B,27,0D,31,11,0D,30,11, 239
2530 DATA 0D,31,11,0D,2C,11,0D,29, 207
2540 DATA 0D,14,25,0D,14,2C,0F,0C, 174
2550 DATA 30,0F,0C,2C,0F,0C,2C,0F, 205
2560 DATA 0C,27,0C,14,27,0C,14,25, 191
2570 DATA 00,0D,25,00,0D,19,00,0D, 101
2580 DATA 19,00,0D,00,00,01,00,00, 39
2590 DATA 01,27,00,0D,27,00,0D,22, 139
2600 DATA 00,0D,22,00,0D,2B,00,00, 103
2610 DATA 2B,00,00,27,14,0C,24,14, 170
2620 DATA 0C,20,14,0C,20,14,0C,2C, 184
2630 DATA 0C,0F,2C,0C,0F,25,14,11, 172
2640 DATA 25,14,11,29,14,11,29,14, 213
2650 DATA 11,20,00,00,20,00,00,27, 120
2660 DATA 14,0C,27,14,0C,27,14,0C, 174
2670 DATA 2C,14,0C,30,00,00,30,00, 172
2680 DATA 00,2C,11,0D,2C,11,0D,25, 185
2690 DATA 11,0D,25,11,0D,29,0D,14, 171
2700 DATA 29,0D,14,2C,0F,0C,27,0F, 199
```

```
2710 DATA 0C,2C,0F,0C,30,0F,0C,2C, 202
2720 DATA 0C,0F,27,0C,0F,2A,00,12, 153
2730 DATA 29,00,11,27,00,0F,27,00, 151
2740 DATA 0F,2C,00,14,2C,00,14,2B, 186
2750 DATA 16,0D,2E,16,0D,33,16,0D, 202
2760 DATA 2E,16,0D,2B,0D,16,2E,0D, 218
2770 DATA 16,27,24,08,27,24,08,2C, 232
2780 DATA 14,08,30,14,08,27,00,14, 163
2790 DATA 27,00,14,2C,0F,0C,2B,0F, 188
2800 DATA 0C,2C,0F,0C,27,0F,0C,24, 185
2810 DATA 0C,14,20,0C,14,2B,16,0D, 174
2820 DATA 2B,16,0D,2E,16,0D,2E,16, 227
2830 DATA 0D,27,0D,16,27,0D,16,29, 202
2840 DATA 14,0D,27,14,0D,29,14,0D, 179
2850 DATA 2C,14,0D,31,0D,11,2C,0D, 213
2860 DATA 11,2B,16,0D,27,16,0D,22, 203
2870 DATA 16,0D,22,16,0D,2B,0D,16, 182
2880 DATA 2B,0D,16,25,14,11,29,14, 213
2890 DATA 11,25,14,11,20,14,11,1D, 189
2900 DATA 00,00,1D,00,00,29,00,0D, 83
2910 DATA 27,00,0D,29,00,0D,2C,00, 150
2920 DATA 0D,31,00,00,2C,00,00,2B, 149
2930 DATA 00,0D,2B,00,0D,2E,00,0D, 128
2940 DATA 2B,00,0D,27,00,00,2B,00, 138
2950 DATA 00,22,00,0D,22,00,0D,27, 133
2960 DATA 00,0F,25,00,0F,24,00,03, 106
2970 DATA 22,00,03,29,14,0D,29,14, 172
2980 DATA 0D,2C,14,0D,2C,14,0D,31, 216
2990 DATA 0D,11,31,0D,11,27,16,12, 188
3000 DATA 2A,16,12,27,16,12,2A,16, 225
3010 DATA 12,24,1B,14,27,1B,14,27, 226
3020 DATA 24,0D,25,22,0D,25,22,0F, 219
3030 DATA 24,20,0F,24,20,03,22,1F, 219
3040 DATA 03,2A,18,14,2A,18,14,27, 214
3050 DATA 18,14,27,18,14,24,00,00, 163
3060 DATA 24,00,00,27,24,14,27,24, 206
3070 DATA 14,24,27,00,24,27,00,27, 209
3080 DATA 24,14,27,24,00,27,00,12, 188
3090 DATA 2A,00,12,2E,00,12,2A,00, 166
3100 DATA 12,27,00,14,24,00,14,27, 172
3110 DATA 13,0F,22,13,0F,27,13,0F, 175
3120 DATA 2B,13,0F,2E,00,00,2B,00, 166
3130 DATA 00,29,00,0D,2E,00,0D,2C, 157
3140 DATA 00,0F,30,00,0F,2B,00,03, 124
3150 DATA 2E,00,03,29,11,0D,25,11, 174
3160 DATA 0D,2C,11,0D,29,11,0D,31, 207
3170 DATA 00,00,2C,00,00,33,13,0F, 129
3180 DATA 33,13,0F,2E,13,0F,2B,13, 227
3190 DATA 0F,27,0D,13,22,0D,13,2C, 196
3200 DATA 14,0C,2C,14,0C,30,14,0C, 188
3210 DATA 2C,14,0C,27,00,00,27,00, 154
3220 DATA 00,2C,0F,0C,2B,0F,0C,2C, 185
3230 DATA 0C,0F,30,0C,0F,27,14,0C, 173
3240 DATA 27,14,0C,2C,00,14,29,00, 176
3250 DATA 14,27,00,08,24,00,08,20, 143
3260 DATA 00,00,20,00,00,25,00,11, 86
3270 DATA 20,00,11,25,00,11,29,00, 144
3280 DATA 11,2C,00,25,29,00,0D,24, 188
3290 DATA 00,08,24,00,08,27,00,08, 99
3300 DATA 27,00,08,2C,00,00,2C,00, 135
3310 DATA 00,2E,0F,0C,2C,0F,0C,2B, 187
3320 DATA 0C,0F,2C,0C,0F,27,14,0C, 169
3330 DATA 27,14,0C,29,25,14,29,25, 247
3340 DATA 14,27,24,08,24,20,08,20, 211
3350 DATA 24,00,20,24,00,27,14,0C, 175
3360 DATA 27,14,0C,2C,14,0C,27,14, 206
3370 DATA 0C,24,00,00,27,00,00,22, 121
3380 DATA 22,0D,29,22,0D,27,24,0F, 225
3390 DATA 25,22,0F,24,20,03,22,1F, 222
3400 DATA 03,2B,0F,0D,2B,0F,0D,2B, 188
3410 DATA 0F,0D,27,0F,0D,2E,0F,0D, 169
3420 DATA 2E,0F,0D,2B,22,03,27,22, 227
3430 DATA 0F,2B,00,0E,2B,00,0F,2B, 173
3440 DATA 00,0D,2B,00,0F,2C,00,0C, 127
3450 DATA 30,00,0C,2C,00,0C,30,00, 164
3460 DATA 0C,27,00,00,27,00,00,22, 124
3470 DATA 13,0D,22,13,0D,22,0D,13, 164
3480 DATA 27,0D,13,2B,16,0D,2B,16, 214
3490 DATA 0D,27,14,0C,29,14,0C,2A, 199
3500 DATA 14,0C,27,14,0C,25,00,08, 148
3510 DATA 24,00,08,25,11,0D,25,11, 165
3520 DATA 0D,20,11,0D,20,11,0D,29, 178
3530 DATA 00,00,29,00,00,2C,0F,0C, 112
3540 DATA 2C,0F,0C,27,0F,0C,24,0F, 188
3550 DATA 0C,20,0C,0F,20,0C,0F,27, 169
3560 DATA 00,12,2A,00,12,22,00,12, 130
3570 DATA 27,00,12,24,00,14,27,00, 152
3580 DATA 14,27,1F,0D,27,1F,0D,2B, 229
3590 DATA 27,0D,2B,27,0D,2E,2B,0D, 249
3600 DATA 2E,2B,0D,29,00,0D,31,00, 205
3610 DATA 0D,30,00,0F,2C,00,0F,2E, 181
3620 DATA 00,03,2B,00,03,2A,00,12, 109
3630 DATA 27,00,12,22,00,12,22,00, 143
3640 DATA 12,24,00,14,24,00,14,25, 167
3650 DATA 20,0D,25,20,0C,29,00,0D, 180
3660 DATA 2A,00,0F,29,00,11,2A,00, 157
3670 DATA 13,27,00,0D,22,00,0D,2B, 161
3680 DATA 00,0D,27,00,0D,2E,00,00, 111
3690 DATA 2B,00,00,27,00,0D,26,00, 133
3700 DATA 0D,27,00,0D,2B,00,0D,2E, 167
3710 DATA 00,00,2B,00,00,2C,0F,0C, 114
3720 DATA 30,0F,0C,2C,0F,0C,27,0F, 200
3730 DATA 0C,24,00,00,20,00,00,25, 117
3740 DATA 14,11,20,14,11,29,14,11, 184
3750 DATA 25,14,11,2C,00,00,2C,00, 162
3760 DATA 00,24,00,08,24,00,08,27, 127
3770 DATA 00,08,24,00,08,22,00,00, 86
3780 DATA 20,00,00,29,00,0D,2C,00, 130
3790 DATA 0D,27,00,0F,25,00,0F,24, 155
3800 DATA 00,03,22,00,03,25,11,0D, 107
3810 DATA 24,11,0D,25,11,0D,29,11, 191
3820 DATA 0D,20,0D,11,25,0D,11,27, 181
3830 DATA 1F,0D,27,00,00,27,1F,0D, 166
3840 DATA 27,00,00,27,1F,0D,27,00, 161
3850 DATA 00,2C,0F,0C,2B,0F,0C,2C, 185
3860 DATA 0F,0C,27,0F,0C,24,00,00, 129
3870 DATA 20,00,00,27,00,14,27,00, 130
3880 DATA 13,20,00,14,20,00,0F,20, 150
3890 DATA 00,0C,20,00,08,27,00,0C, 103
3900 DATA 27,00,0C,24,00,0C,24,00, 135
3910 DATA 0C,20,00,00,20,00,00,27, 115
3920 DATA 18,14,30,18,14,2C,18,14, 224
3930 DATA 27,18,14,24,00,00,24,00, 155
3940 DATA 00,25,11,0D,25,11,0D,25, 171
3950 DATA 11,0D,27,11,0D,29,00,00, 140
3960 DATA 29,00,00,2C,11,0D,2C,11, 176
3970 DATA 0D,2A,11,0D,29,11,0D,27, 195
3980 DATA 00,00,25,00,00,29,00,0D, 91
3990 DATA 2C,00,0D,27,00,0F,2C,00, 155
4000 DATA 0F,22,00,03,2B,00,03,24, 134
4010 DATA 14,08,25,14,08,27,14,08, 160
4020 DATA 29,14,08,2A,0C,14,27,0C, 194
4030 DATA 14,2A,00,12,22,00,12,22, 178
4040 DATA 00,12,22,00,12,24,00,14, 126
4050 DATA 27,00,14,20,11,0D,20,14, 173
4060 DATA 00,25,11,0D,25,14,00,29, 165
4070 DATA 11,0D,29,14,00,29,00,14, 152
4080 DATA 25,00,14,24,00,08,27,00, 140
4090 DATA 08,2C,00,00,2C,00,00,2E, 142
4100 DATA 0F,0C,2C,0F,0C,30,0F,0C, 173
4110 DATA 2C,0F,0C,27,0C,0F,2C,0C, 193
4120 DATA 0F,00,00,00,00,70,04,31, 180
4130 DATA 04,F4,03,BC,03,86,03,53, 662
4140 DATA 03,24,03,F6,02,CC,02,A4, 660
4150 DATA 02,7E,02,5A,02,38,02,18, 304
4160 DATA 02,FA,01,DE,01,C3,01,AA, 842
4170 DATA 01,92,01,7B,01,66,01,52, 457
4180 DATA 01,3F,01,2D,01,1C,01,0C, 152
4190 DATA 01,FD,00,EF,00,E1,00,D5, 931
4200 DATA 00,C9,00,BE,00,B3,00,A9, 739
4210 DATA 00,9F,00,96,00,8E,00,86, 585
4220 DATA 00,7F,00,77,00,71,00,6A, 465
4230 DATA 00,64,00,5F,00,59,00,54, 368
4240 DATA 00,50,00,4B,00,47,00,43, 293
4250 DATA 00,3F,00,00,00,F4,03,BC, 498
4260 DATA 03,86,03,53,03,24,03,F6, 511
4270 DATA 02,CC,02,A4,02,7E,02,5A, 592
4280 DATA 02,38,02,18,02,FA,01,DE, 559
4290 DATA 01,C3,01,AA,01,92,01,7B, 638
4300 DATA 01,66,01,52,01,3F,01,2D, 296
4310 DATA 01,1C,01,0C,01,FD,00,EF, 535
4320 DATA 00,E1,00,D5,00,C9,00,BE, 829
4330 DATA 00,B3,00,A9,00,9F,00,96, 657
4340 DATA 00,8E,00,86,00,7F,00,77, 522
4350 DATA 00,71,00,6A,00,64,00,5F, 414
4360 DATA 00,59,00,54,00,50,00,4B, 328
4370 DATA 00,47,00,43,00,3F,00,3C, 261
4380 DATA 00,38,00,15,06,3E,24,42, 247
4390 DATA 55,27,60,22,03,0C,15,06, 296
4400 DATA 3E,10,42,55,27,2F,70,4B, 502
4410 DATA 0C,6F,66,7B,5B,76,19,86, 716
4420 DATA 5C,26,81,0A,25,38,0D,49, 448
4430 DATA 29,83,31,2E,7A,36,54,56, 613
4440 DATA 73,77,7E,47,7B,51,6E,43, 812
4450 DATA 6B,1A,63,2A,32,02,50,3D, 467
4460 DATA 69,4A,67,2B,21,0B,6A,5A, 565
4470 DATA 7C,20,5F,14,85,37,74,57, 662
4480 DATA 05,1D,05,1D,05,1D,05,1D, 136
4490 DATA 05,1D,05,3F,5E,3B,4E,17, 356
4500 DATA 6C,0F,61,3A,53,1F,62,23, 525
4510 DATA 6D,8A,71,40,79,4C,45,04, 694
4520 DATA 13,18,65,0E,07,39,76,2D, 385
4530 DATA 2C,12,1C,58,09,33,68,1E, 372
4540 DATA 64,1B,89,82,48,80,4F,2D, 718
4550 DATA 88,34,3C,44,52,27,2F,22, 518
4560 DATA 35,0C,2D,11,34,7D,42,52, 452
4570 DATA 84,2F,22,35,0C,59,5D,72, 574
4580 DATA 30,01,16,4D,41,75,87,28, 505
4590 DATA 08,08,08,08,08,08,08,46, 126
4600 DATA 46,46,08,18,42,11,24,69, 396
4610 DATA 21,34,69,01,10,00,ED,B0, 620
4620 DATA FD,21,13,69,18,65,98,40, 751
4630 DATA 20,80,BE,00,14,06,64,0E, 490
4640 DATA 01,02,00,0D,08,00,00,0C, 36
4650 DATA 15,7B,29,6B,2B,85,1D,0F, 512
4660 DATA 4C,07,89,2D,0C,41,08,55, 435
4670 DATA 55,76,83,1A,4A,57,1D,61, 647
4680 DATA 23,58,4F,44,11,01,08,FD, 549
4690 DATA 21,13,69,21,45,68,DD,21, 617
4700 DATA 23,69,06,10,11,00,00,19, 215
4710 DATA ED,5F,FD,56,08,82,57,FD, 1149
4720 DATA 72,08,E6,0F,FE,0B,30,F0, 920
4730 DATA E5,16,00,5F,C6,30,CD,5A, 887
4740 DATA BB,19,7E,E1,DD,23,DD,77, 1159
4750 DATA 00,10,D9,3E,05,F5,0E,00, 559
4760 DATA CD,34,BD,F1,3D,FE,FF,20, 1289
4770 DATA F4,3E,07,0E,38,CD,34,BD, 829
4780 DATA FD,34,00,3E,08,FD,4E,09, 715
4790 DATA F5,CD,34,BD,F1,3C,FE,0B, 1257
4800 DATA 20,F3,F3,FD,46,0B,C5,C5, 1246
4810 DATA 06,08,21,24,69,FD,5E,05, 540
4820 DATA 16,00,19,EB,C5,1A,13,D5, 737
4830 DATA 47,21,00,00,11,12,00,19, 164
4840 DATA 10,FD,01,B8,5D,00,09,06, 562
4850 DATA 06,C5,AF,32,1A,69,AF,BE, 924
4860 DATA 20,06,CD,47,6A,AF,18,19, 644
4870 DATA 46,FD,CB,00,46,28,05,11, 658
4880 DATA 80,67,18,03,11,E8,67,13, 629
4890 DATA 13,10,FC,1A,13,CD,47,6A, 714
4900 DATA 1A,CD,47,6A,23,3A,1A,69, 632
4910 DATA FE,06,38,CF,FD,46,04,0E, 864
4920 DATA 00,0D,20,FD,10,F9,3E,2E, 671
4930 DATA CD,5A,BB,C1,05,C2,C6,69, 1177
4940 DATA 3E,42,CD,5A,BB,D1,C1,05, 1017
4950 DATA C2,B1,69,FD,46,06,0E,00, 819
4960 DATA 0D,20,FD,10,F9,3E,50,CD, 910
4970 DATA 5A,BB,C1,05,C2,A4,69,FD, 1191
4980 DATA 36,05,08,C1,10,06,FD,36, 589
4990 DATA 05,00,18,05,C5,04,C3,A4, 594
5000 DATA 69,3E,07,0E,3F,CD,34,BD, 697
5010 DATA FB,C9,C5,00,00,00,00,00, 649
5020 DATA 4F,3A,1A,69,CD,34,BD,F3, 957
5030 DATA 00,00,00,00,00,FD,34,07, 312
5040 DATA 00,00,00,00,00,C1,C9,00, 394
5050 DATA 00,00,00,00,00,00,00,00, 0
```

ACU

EPSON HI-80 Printer/Plotter

This nifty unit breaks new ground in hard-copy by allowing both printing in a standard Epson environment, and a powerful plotting capability. The unit measures 415 x 275 x 80mm and weighs in at 4.5Kgs. The plotter comes as standard with a Centronics interface, the serial interface board is an optional extra.

The control panel on the top of the plotter contains 7 membrane key switches (beerproof, à la ZX81) plus the power on/error LEDs. The main switch is the on/off line as none of the other keys have any effect while the plotter is on line. The subservient switches control the pen carriage, four switches move the pen up-down-left-right, one lifts/lowers the pens on to the paper and the last caps the pens by removing the pen carriage from the plotting area to the right, into the capping area. This last move is quite important for two reasons: it enables pens to be changed without blotting your masterpiece, and stops the rather expensive pens from drying out.

SETTING UP

Removing two philips type screws releases the case lid. Lift the lid gently and remove the PCB/control panel connector to gain access to the innards. At the rear of the PCB in the centre is the 6 way DIP switch which controls the switch-on state of the machine. This includes the paper size, plotting mode select and linefeed suppression (this means that Arnold users don't have to butcher their printer leads to stop unwanted line-feeds after carriage returns).

Also on the PCB at the rear left hand edge are two DIL sockets, these are for additional expansion, one is for 8K of RAM and the other is for additional facility ROMs. The RAM option (£70.00) can be used in two ways, either as a printer buffer to increase printing efficiency, or to allow the downloading of user defined character sets into the printer (Arabic, Japanese etc). There are two additional ROMs available (but only one socket, so make your mind up). The first is an extended printer ROM (£27.50) which allows near letter quality printing and hi-res screen dumps, the second (£55.00) lets the HI-80 emulate a Hewlett-Packard GP series plotter. The HI-80 can be set up for 3 sizes of paper, A4,A5 and American letter size, note that standard A4 continuous stationery with perforated tractor feed strips will not fit unless you tear the perforations off first.

MODES

The plotting area is a 'window' in a much larger plotting area of -32768 to 32767 in both the x and y axis. The commands use co-ordinates based on 0.1 of a millimetre and so on A4 paper there are 2670 x 1920 addressable points (267 x 192 mm). The origin of the 'window' can be set anywhere in the larger plotting area.

Plotting Mode 0 is the extended plotting mode and is really the reason you bought the plotter in the first place. There are 42 commands which comprise two ASCII characters followed by the required parameters. All the expected plot and drawing commands are present plus lots of other goodies like curve shaping (connecting specified points with a smooth curve), drawing & hatching boxes and pie segments, character direction and size. The following example shows some of the possibilities.

```
10 PRINT#8,"si 100,80"      'set character SIze to 10mm x 8mm
20 PRINT#8,"sp 3"           'Select Pen number 3
30 PRINT#8,"ma 1300,1100    'Move Absolute to position x,y
40 FOR a=0 TO 26
50   PRINT#8,"la"CHR$(a+64)  'LAbel with ASCII character
60   PRINT#8,"di"STR$(-130*a)'change print DIrection
70 NEXT
```

The program plots the letters of the alphabet in a circle by changing the angle of print by 13 degrees after plotting each character.

Plotting Mode 1 is the basic plotting mode with fewer (18) single character commands covering the basic plotter functions, drawing lines, printing characters etc. This seems a bit like having a Fiat 500 emulation mode in a Jag XJS but it does mean that the commands are compatible with the Watanabe plotter(s) and very similar to the Silver Reed EB-50 reviewed in an earlier issue. Emulation is one of the new gods.

In the printer mode the HI-80 behaves exactly as an Epson printer should. Most of the expected control characters are there, the notable exception being the Hi-res plotting which requires the add-on ROM. Included are 11 national character sets, 4 type faces, underlining super and sub-scripts et al. There are four type faces, Normal - Italic -Pica - Elite, but the printed characters can be any size you want. As well as the 'standard' Epson [ESC]ape sequences there are some extra ones which use the plotting capability. These commands are prefixed by [GS], (group and direction as well as returning to plotter mode 0.

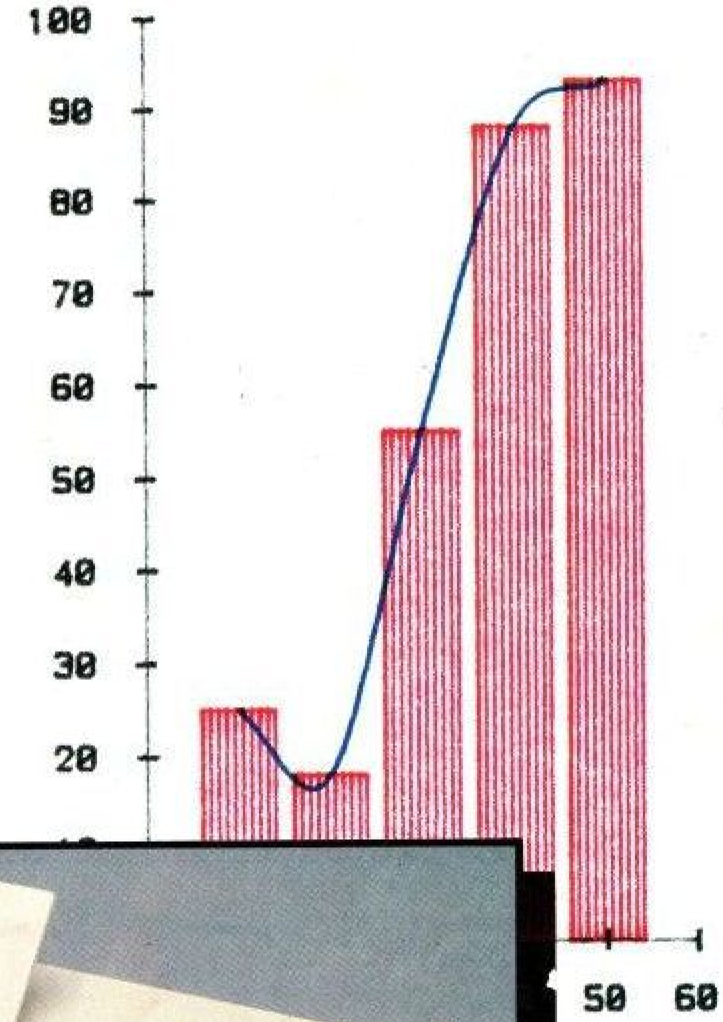
The thing that really grabbed my attention about the plotter commands was the fact that all the commands are made up of standard ASCII characters rather than escape sequences. Therefore, no matter how characters are output to the printer,if they are valid, they will be interpreted as plotting commands. This means that characters can be embedded in any piece of applications software and when sent to the printer, graphics will result. Thus logos, motifs etc. can be plotted in text documents created with Amsword or Microscript, even the headed note paper can be drawn first. Also data from spread sheets such as Microspread can be directly used to draw pie charts, line graphs etc.

CONCLUSION

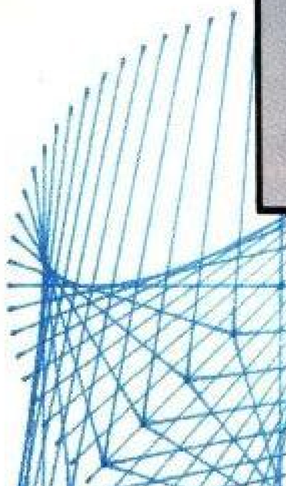
I liked the unit very much, although the printing mode is nowhere as fast as a standrd dot-matrix printer, it is still quicker than a lot of plotters. If you need good graphics output with limited printing requirements this unit is very

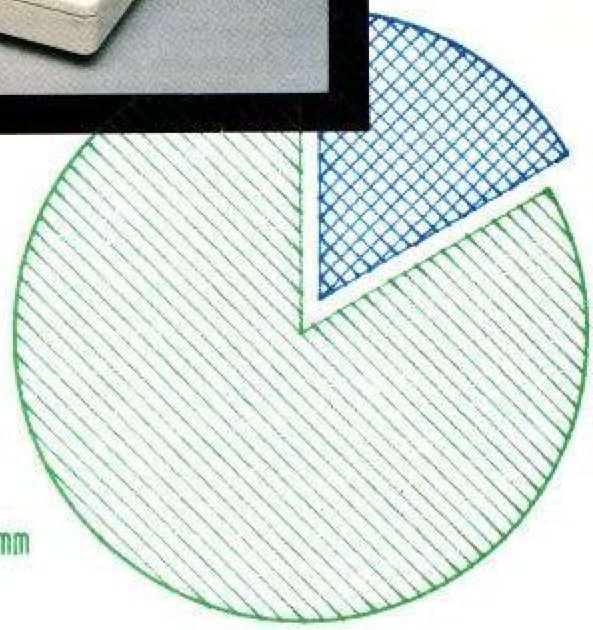
good value for money at about £400 + VAT, if you need to do a lot of printing as well, it would probably be worth while buying one of the cheaper dot-matrix machines to do the donkey-work and save the HI-80 for best. The only negative points I could find are the noise it produces and that the replacement ones are over £1.50 each.











```
10 PRINT#8,"si 100,80"      'set character size to 10mm x 8mm
20 PRINT#8,"sp 3"           'select pen # 3
30 PRINT#8,"ma 1300,1100"  'move to absolute position x,y
40 FOR a=0 TO 26
50    PRINT#8,"la"CHR$(a+64)
60    PRINT#8,"di"STR$(-130*a) 'angle at 130 x 0.1 (13) degrees
70 NEXT
```

ACU

Gemini

SERIOUS SOFTWARE FOR THE AMSTRAD 464/664

The Cash Book Accounting programs described below are designed for the small to medium sized business, whether a sole trader, partnership or limited company. All need an Amstrad 464 or 664, an 80 or 132 column printer and cassette or disk storage.

Each program has been specially written to use the computer's huge memory and is a 'stand alone' program. However, the Cash Book and Final Accounts programs also interface to produce a superb combination pack for really serious business users, as well as practising accountants.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. The software is, however, capable of advanced accounting use, and in order to fully appreciate and interpret the Balance Sheet a discussion with your professional adviser or Bank Manager may be advisable.

We confidently recommend these programs to serious commercial owners of the Amstrad, and hope they will enable you to operate your business on a more effective, efficient and profitable basis.

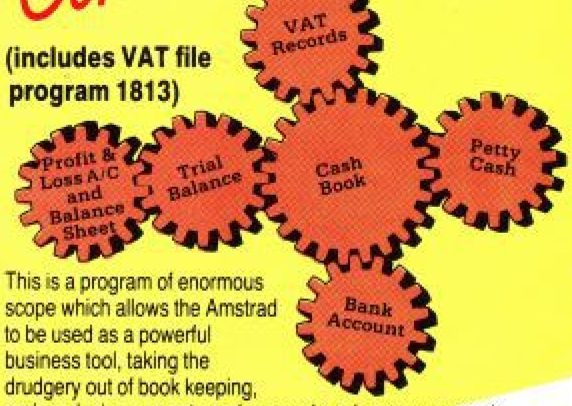
Dale J. Hubbard, Managing Director

Peter S. Meherne MIAP **Software Director**

THE **COMPLETE** CASH BOOK ACCOUNTING SYSTEM

Cash Book

(includes VAT file program 1813)



This is a program of enormous scope which allows the Amstrad to be used as a powerful business tool, taking the drudgery out of book keeping, and producing accurate and comprehensive management information.

In its simplest form the program will replace your Cash and Petty Cash books BUT Gemini's program, in effect, does much more. In addition to recording cash and bank transactions, the program will allow you to enter credit sales and purchases, and for all of these entries it will automatically complete the double entry routines, to ensure that your records are always in balance.

Sales and Purchase ledger control accounts are included, which makes the program ideal for integration with an existing manual sales or purchase ledger system.

The program also includes the following features:

1. Balance at Bank for up to 5 separate Bank Accounts.
2. Petty Cash in hand for up to 3 separate Cash Accounts.
3. A listing of all nominal account titles (maximum 199), most of which are user definable).
4. Monthly transaction summaries and departmental analyses of sales and purchases.
5. VAT memo account balances (sales/net purchases), and VAT accounts.
6. Batch printouts of all transactions entered in current program run.
7. Total debtors and creditors, sales, overheads and Trial Balance.

The program is therefore a complete 'stand alone' accounting software package, ideal for both business users, and practising Chartered Accountants, since an infinite number of different Cash Books may be kept on a single Amstrad.

A full audit trail of all data entered in the program is produced and a journal entry routine is incorporated to facilitate adjustments to individual nominal accounts, prior to producing a final Trial Balance. The latter interfaces automatically with Final Accounts program C.1806, so that a Profit and Loss Account and Balance Sheet can be prepared from data held in the Cash Book program.

Cassette C.1805 £59.95
Disk D.1805 £64.95

VAT File

Whilst this program will benefit most VAT registered businesses, it is also designed for those users who are on one of the special retailers schemes for VAT, which requires them to analyse their expenditure invoices over the various rates of VAT, in order to calculate their VAT output tax. The program will provide the following:

1. A means of recording invoices.
2. A printed copy of all invoice details.
3. Accumulated totals of different types of transactions.
4. The facility for coping with a multi-rated VAT system.
5. Information needed for the preparation of VAT returns.
6. The facility to sort and print transactions by date, invoice reference or customer/supplier name.

The package is capable of dealing with up to 140 transactions in a single batch and the different transaction types are processed in separate batches, which are then printed out as a permanent record. Cumulative totals for gross takings, VAT at standard rate etc. are stored in a data file on disk or tape which can be loaded at the start of every session to provide 'brought forward' totals for the program.

Cassette C.1813 £19.95
Disk D.1813 £25.95

Final Accounts

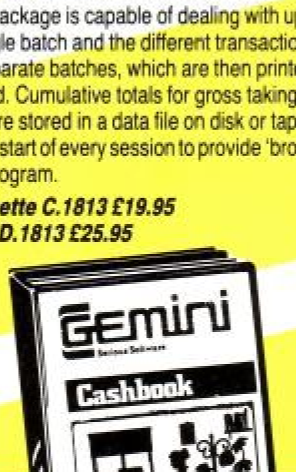
This program is designed to produce a Trading and Profit & Loss Account and Balance Sheet, either from the final Trial Balance produced by Cash Book program 1805 or from any other Trial Balance making it a truly stand alone 'Final Accounts' program.

The facility to produce these documents quickly, accurately, and regularly is of enormous help in running any business, large or small, since one shows the true profitability achieved, and the other the exact strength of the business in terms of assets and liabilities.

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Writing Adventures

PART V

by Bill Brock

This is the fifth in a series of six articles that is intended to give the newcomer to writing adventure programs an idea of how to go about it. The principle behind the series has been to give you the reader, a basic operating system for adventure games written in BASIC.

This system provides the core upon which you can add on the data for your own adventure; whether it be science-fiction, medieval or police detection. Until now, I have provided groups of program lines that you should have copied faithfully (or with your own improvements...).

Although you may still do that if you wish, we have now arrived at those sections that are very much what 'you' need for 'your' program. Last month we looked at how we determined which words, entered in the form of a command, were to be accepted and subsequently actioned.

We followed that with three commands that are pretty well common to all adventures - GET (or TAKE, DROP (or PUT) and EXAMINE (or SEARCH). Finally we looked at one that crops up quite often - WEAR. Now these were listed at the appropriate line numbers to suit 'my' program and may have been numbered differently for 'yours'.

This month we will look at several other commands and the action taken in the program that 'I' have in mind. These may or may not be applicable to the program that 'you' have in mind but hopefully the general format will help you construct routines that will work for you.

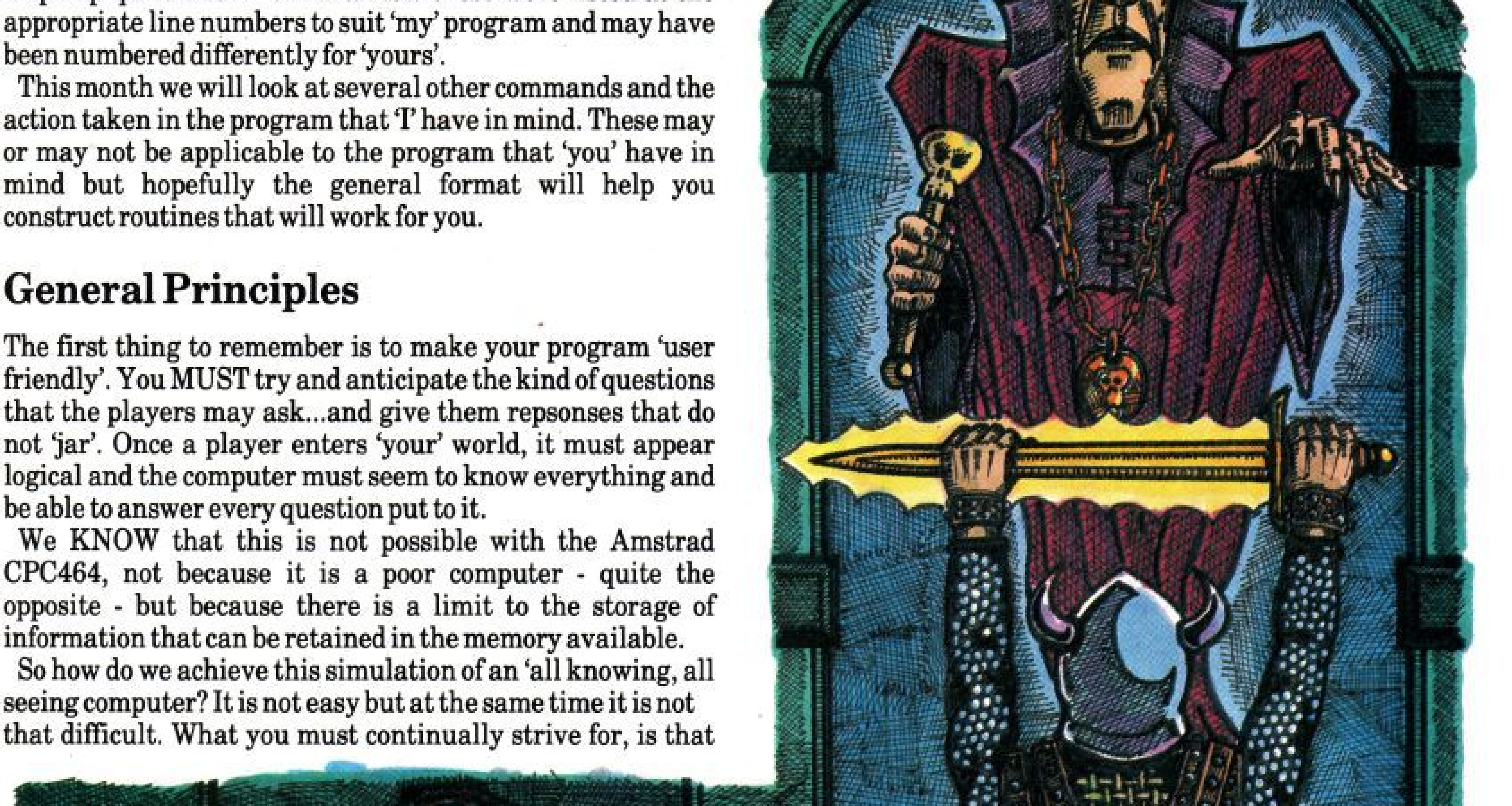
General Principles

The first thing to remember is to make your program 'user friendly'. You MUST try and anticipate the kind of questions that the players may ask...and give them repsonses that do not 'jar'. Once a player enters 'your' world, it must appear logical and the computer must seem to know everything and be able to answer every question put to it.

We KNOW that this is not possible with the Amstrad CPC464, not because it is a poor computer - quite the opposite - but because there is a limit to the storage of information that can be retained in the memory available.

So how do we achieve this simulation of an 'all knowing, all seeing computer? It is not easy but at the same time it is not that difficult. What you must continually strive for, is that the computer's response must be absolutely accurate, ambiguous or phrased in such a manner that it seem that the answer is so unimportant (or obvious); that it is below the computer's dignity to answer.

Play the game yourself but ask stupid questions - are the answers acceptable, or do they make you think something is not quite right? Last month we had a line (6912) that was supposed to cover SEARCHing objects that had no specific object data...but, like Shops, Streets or Courtyards, were mentioned in the location description.

This produced a response "I have far-sight and hind-sight...but, I see nothing!" This was intended for players who EXAMINEd objects not at that location but the addition of "of interest" makes the response much more acceptable. Now, the computer is inferring that it has looked 'everywhere' but that object has no significance.

This answer (one of many possible...), solves the age old problem of dealing with words that the program should recognise...but does not have an 'in depth' series of responses because they are not significant to the adventure.

If you think that a particular command (or others of a similar nature) will be used - USED ELEPHANT, MOVE MOUNTAIN etc then always consider the use of several random repsonses (lines 600-650). These are either ambiguous or condescending and are much better than a simple CAN'T, WHAT? or I DON'T UNDERSTAND. The memory used is well spent.

Always allow for the player who will try the unexpected. Perhaps your adventure has 'rescuing the Princess' as its main theme, believe me; someone will probably save her and then type in "KILL PRINCESS"... make sure 'your' program can cope with this sort of approach.

Back to the system

This adventure operating system derives three words from the input command - Verb, Modifier and Object. If these are acceptable (recognized by the program's dictionary at lines 14000 - 14200), then after sorting out if a single key or single word command has been input, the program actions the command by first looking at the Verb.

There are routines associated with each recognised verb, and these determine the response to the input. Almost invariably the first few lines of the routine are conditional subroutines (IF...THEN) that check the validity of that Verb with the specified Object.

YOU may know that the Dragon only appears at one location and can be bribed by giving it the Ruby Sphere but your players have got to find that out for themselves. What if they offer the Dragon something else? What if they try giving the Ruby at another location? What if they offer something they do not have? All these possiblities MUST be catered for. Let us look closely at a few examples...

Be Generous...

I have used GIVE (or OFFER) several times in my program to either get something vital in return, or to have paths previously closed to the player opened up for exploration.

```
1 REM ** LIST - 29
990 FOR I=1 TO 3000:NEXT I
7299 REM ** Give, Offer
7300 IF N%>31 AND N%<>76 AND N%<>77 THEN
     655
7305 IF OP%(N%)<>0 AND OP%(N%)<>-1 THEN
     PRINT #2,"You do not have this to g
     ive!":GOTO 1500
7310 REM
7315 REM
7320 REM
```

```
7325 IF L%<>4 AND L%<>13 AND L%<>23 AND
     L%<>24 AND L%<>25 AND L%<>29 THEN P
     RINT #2,"There is no-one to give an
     ything to...":GOTO 1500
7330 IF L%=4 THEN PRINT #2," The old man
      is but a ghost from the     past..
     .he can accept nothing from the    p
     resent!":GOTO 1500
7335 IF L%=13 THEN PRINT #2," The Troll
     takes your gift and destroys  it im
     mediately!":OC%(N%)=6:OP%(N%)=-10:C
     %=C%=1:GOTO 1500
7340 IF L%=23 AND N%<>16 AND (OP%(26)=0
     OR OP%(26)=-1) THEN PRINT #2,"The w
     ood nymph declines your kind gift":
     GOTO 1500
7345 IF L%=23 AND N%=16 AND (OP%(26)=0 O
     R OP%(26)=-1) THEN PRINT #2," The w
     ood nymph smiles shyly and takes
     the rose and gives you a golden rin
     g":OP%(16)=-10:OP%(14)=0:OC%(14)=1:
     GOTO 1500
7350 IF L%=23 THEN PRINT #2,"The nymph h
     ides shyly behind the tree!":GOTO 1
     500
7355 IF (L%=24 OR L%=25) AND N%<>5 THEN
     PRINT #2,"The ferryman ignores your
      offer...":GOTO 1500
7360 IF (L%=24 OR L%=25) AND OP%(5)=0 TH
     EN PRINT #2," The ferryman takes a
     coin in silence    and ferries you
     across the wide river":IF L%=24 THE
     N L%=25:GOTO 990 ELSE L%=24:GOTO 99
     0
7365 IF L%=29 AND N%=17 AND OP%(17)=0 TH
     EN PRINT #2," The Dragon greedily s
     natches the ruby   and moves to the
      far end of the cave!":E(29)=30:OP%
     (17)=35:OC%(17)=5:OS$(17)="An Enorm
     ous Ruby Orb":C%=C%=1:GOTO 1500
7370 PRINT #2," The Dragon roars in ange
     r and burns     you to a crisp!":GO
     TO 16000
```

The first line (7300) checks to see that the object offered is one of those that players could at sometine pick up and have in their possession. We do not want to permit something like GIVE POOL, do we? If such a command was input then the program is returned to the input routine at line 1500 via a pointed message at line 655.

The second line (7305) checks to see if that object is in fact being carried. This check has to come second because OP%() array only has 31 elements (the number of items with Object data). The program would crash if you asked it to check OP%(45), as could happen if this line came before line 7300.

Next follow three lines of REMs to allow for extra conditions 'you' may wish to apply. Creatures that could conceivably be offered something, only appear at fixed locations, so line 7325 checks to see if the present location (L%) is one of those.

The locations are dealt with in order. The first at location 4 is simple, as the Old Man appearing there turns out to be a ghost from the past and cannot accept anything.

The Troll at location 13 is not intended to be given anything, he merely stops you taking items from his cave. He will destroy anything you give him. To do this we make the Class of object given unobtainable (OC%(N%)=6) and make its Position - nowhere - (OP%(N%)=-10), we must not forget to adjust the number of objects carried (C%=C%-1).

Next we come to the delightful wood Nymph at location 23... the intention here is that she will give you a magic gold Ring (object 14) in return for the Rose (object 16). But she is shy and will only accept the rose if you also have the Talisman (object 26) taken from the Statue in her likeness.

Lines 7340 - 7350 should now be self explanatory. The first two check to see if you are in the right place, whether you have or are wearing (OP%()=-1) the Talisman and if your gift is the Rose. If these conditions are not met then 7350 gives a different message and returns the program to an input request at 1500.

Note there are different reponses dependent upon the various conditions hopefully providing some clues to the player.

Lines 7355 and 7360 deal with the Ferryman at location 24 (or 25 - the other side of the river). Given a Coin he will row the player across the river. Again the order that these lines are numbered is important, here we deal with the non-action case first.

If line 7360 is reached, then the fit MUST be object 5 (Coin) so although there is no need to check for this, we must check that the player has actually got some. We also know that the location is by the river (L%=24 or 25), so we merely change L% to 25 or vice versa.

As the location is about to be changed the program returns to the start of the game loop via a delay at 990 to enable the player to first read what happens when he hands over the fare.

The final area where GIVE has any effect is in the Dragon's Cave. The right gift (carved Ruby Sphere N%=17) 'encourages' the Dragon to move, so revealing another exit to the cave (E(29) was 0, becomes 30). In addition to this I make use of Object 17 for a second time, by changing the Ruby Sphere to an Enormous Ruby Orb and hiding it deeper in the caves.

Should the player offer the wrong gift, the Dragon takes offence and burns the player to a crisp...

The final answer...

Sudden death can occur at several locations. The aim of any adventure is to learn about the 'world' to which you find yourself transported. A sensible player will make use of any SAVE routine provided (you'll have to wait to next month for that one) and gradually build up an understanding of the problems that have been set by the programmer.



```
1 REM ** LIST-30
15999 REM ** Death routine
16000 DL=10:GOSUB 950
16005 PRINT #2:PRINT #2," As all goes da
      rk, a distant scream      laments
      your passing"
16010 CLS #3:LOCATE #3,2,2
16015 DL=10:GOSUB 950
16020 PRINT #3,"Do you want to try again
        Y/N ?"
16025 A$=UPPER$(INKEY$):IF A$="" THEN 16
      025
16030 IF A$="N" THEN CLS:STOP
16035 IF A$="Y" THEN RUN
16040 GOTO 16025
```

The death routine at line 16000 is fairly straight-forward but do remember to offer the player the choice of starting again. There is nothing worse than finding yourself dead and having to re-load the program from scratch...especially if this (as is most likely) is going to take several minutes.

Having raised the question of violence to the player, I suppose now may be an appropriate moment to consider such input commands as KILL, ATTACK, HIT, STAB etc...

When the pen breaks...

On most occasions the pen is mightier than the sword, or at least the 'keyed in' input...but there are bound to be times when either you the programmer or the player are certainly going to need direct action.

The very nature of adventure games engenders a fair amount of frustration and the typed input KILL XXXX is almost bound to be considered as a legitimate course of action.

Even if you do not feel the need for this within your adventure, it is as well to recognize this form of outlet for the players feelings and include at least some appropriate responses.

In the program we have been considering here, I have two locations where an attack of some kind is necessary to eventual success. Now, requiring some form of attack on two creatures, I MUST allow for the player trying the same approach elsewhere.

```
1 REM ** LIST-31
5599 REM ** Kill, Attack, Hit, Stab, Str
     ike
5600 IF LEFT$(W$(1),4)="STRI" AND N%=18
     AND OP%(18)=0 THEN 5675
5605 REM
5610 REM
5615 REM
5620 IF L%<>4 AND L%<>13 AND L%<>20 AND
     L%<>23 AND L%<>24 AND L%<>25 AND L%
     <>29 THEN 655
5625 IF L%=4 THEN PRINT #2,"You can't...
     he's a ghost!":GOTO 1500
```

```
5630 IF L%=13 AND OP%(3)=0 AND OP%(21)=0
      THEN PRINT #2," The arrow flies tr
     ue...the huge Troll  screams in pa
     in and staggers dying      out of t
     he cave...":OP%(21)=-10:C%=C%-1:L$(
     13)=LEFT$(L$(13),LEN(L$(13))-14):F%
     (2)=1:GOTO 990
5635 IF L%=13 AND F%(2)=0 THEN PRINT #2,
     " The Troll seems to be invunerable
      to    any weapon you have...he loo
     ks very,    very angry!":GOTO 1500
     ELSE IF L%=13 THEN 655
5640 IF L%=20 AND OP%(3)=0 AND OP%(19)=0
      THEN PRINT #2," Using the stick as
      an arrow, you shoot  at the eagle.
     ..but the stick does not   fly true
     . The eagle screams and flaps   to
     another branch":OC%(7)=1:OP%(19)=18
     :C%=C%-1:GOTO 1500
5645 IF L%=20 AND OP%(3)=0 AND OP%(21)=0
      THEN PRINT #2," The arrow flies tr
     ue but your aim is    poor...you mi
     ss!":OP%(21)=17:C%=C%-1 ELSE IF L%=
     20 THEN 655
5650 IF L%=23 THEN PRINT #2," Fortunatel
     y the wood nymph is faster    than
     you...and hides behind her tree!":G
     OTO 1500
5655 IF L%=24 OR L%=25 THEN PRINT #2," T
     he hooded ferryman must be immortal
     ,   your blows have no effect whats
     oever!":GOTO 1500
5660 IF L%=29 THEN PRINT #2," The Dragon
      is angered beyond belief:    He te
     ars you limb from limb...":GOTO 160
     00
5665 REM
5670 REM
5675 IF OP%(25)<>0 THEN PRINT #2," You h
     ave bruised your thumb on the
     piece of steel!":GOTO 1500
5680 IF F%(3)=1 THEN PRINT #2," Sparks f
     all on the tinder, which then   bur
     ns steadily...":F%(3)=2:GOTO 1500 E
     LSE PRINT #2," A shower of sparks f
     alls into the       empty tinderbox
     ":GOTO 1500
```

Always remember that the English language is a strange beast...and look for unexpected synonyms or double meanings to the words you have in 'your' vocabulary. Such a problem could arise with the word STRIKE.

Amongst the objects scattered around in 'my' world is an empty Tinderbox. The player is expected to find (create) the required tinder and to find a piece of Steel to use with the 'built in' flint.

Yes, I also cover the situation with a command MAKE FIRE and USE TINDERBOX but STRIKE STEEL is also a legitimate solution...so the first line (5600) checks to see if this was in the player's mind. The following REMs are for any further such conditions that may arise on later consideration.

Line 5620 checks to see if the present location (L%) has anything to attack, these locations are the only places where any creature is mentioned. The old man at location 4, is easy to deal with as he turns out to be a ghost and cannot be attacked.

The Troll at 13 is a different case and it is necessary to remove him to get the items he guards. This is only possible by using the Bow (object 3) and Arrow (object 21). Note that if the Arrow is used then it disappears from the game (OP%(21)=-10). Also, as the Troll is mentioned in the location description, the last 14 characters from the description have to be removed.

One other important point is the use of the 'Flag array' F%(). There are a number of times during an adventure when the program needs to know if a certain action has taken place. Has a Lamp been lit, the Troll killed, the Tinderbox been filled with tinder?

If it is possible to determine by checking the Class (OC%()) of an object then do so...there is no point in using valuable memory or variable space. Occasionally there is no alternative but to set a flag (F%()=1 etc). Keep a careful note of what each flag means.

Lines 5640 and 5645 deal with attacking the Eagle; the intention is that the player should use the Stick (object 19) as an arrow. This will not fly true and will only scare the eagle which will then 'shed' a Feather from which an Arrow can be made. Needless to say some people will return with the Arrow and have another go therefore line 5645 allows for this...

The Ferryman and the Dragon are not intended to be attacked and lines 5635 and 5660 should be now by fairly obvious. Finally, lines 5675 and 5680 deal with STRIKE STEEL, the first response is if no Tinderbox is owned, followed by messages dependent upon whether tinder is present.

```
1 REM ** LIST-32
2115 IF V%=37 THEN 2155
5999 REM ** Clean
6000 IF N%>73 THEN 655
6005 REM
6010 IF OP%(13)<>0 THEN PRINT #2,"Fine..
     .what with?":GOTO 1500
6015 REM
6020 IF N%<>30 THEN PRINT #2,"Was a bit
     dusty...looks better now!":GOTO 150
     0
6025 REM
6030 IF OP%(30)<>L% AND OP%(30)<>0 THEN
     665 ELSE PRINT #2," That's better,
     you can almost see your  face in th
     e blade now...":F%(1)=1:GOTO 1500
6399 REM ** Cut, Chop
6400 IF OP%(1)<>0 AND OP%(30)<>0 THEN PR
     INT #2,"You have nothing to ";W$(1)
     ;" with...":GOTO 1500
6405 REM
6410 IF N%<>16 AND N%<>20 AND N%<>54 AND
      N%<>64 THEN PRINT #2,"Hero you may
```

```
      be but vandal surely not!":GOTO 15
      00
6415 REM
6420 REM
6425 IF N%=16 THEN PRINT #2,"Snick...":O
     B$(16)="A rose lies on the ground":
     GOTO 1500
6430 IF N%=20 THEN PRINT #2,"Carefully y
     ou ";W$(1);" the wood into fine":PR
     INT #2," dry shavings...":OP%(23)=L
     %:OC%(23)=1:GOTO 1500
6435 IF N%=54 AND (L%>16 AND L%<24) THEN
      PRINT #2," Cracckkk...":PRINT #2,"
      Perhaps you are a vandal after all
     ...":GOTO 1500
6440 IF N%=64 AND L%=23 THEN PRINT #2,"
     The Elm is magic and deflects your
          knavish blade!":GOTO 1500 ELSE
      PRINT #2,"None here...":GOTO 1500
7699 REM ** Make
7700 IF N%<>21 AND N%<>45 THEN PRINT #2,
     " In this reincarnation you may exp
     ect    to do many things...but not
     that!":GOTO 1500
7705 REM
7710 REM
7715 IF N%=21 AND (OP%(7)<>0 OR OP%(19)<
     >0) THEN 7750
7720 IF N%=21 THEN PRINT #2," It is wond
     erful what you can do if you  have
     the right materials!":OP%(21)=0:OP%
     (7)=-10:OP%(19)=-10:C%=C%-1:GOTO 15
     00
7725 REM
7730 REM
7735 REM
7740 IF N%=45 AND (F%(3)=0 OR OP%(25)<>0
      OR OP%(18)<>0) THEN 7750
7745 PRINT #2," Using the tinderbox and
     the steel you   soon have the tinde
     r burning fiercely":F%(3)=2:GOTO 15
     00
7750 PRINT #2,"You do not have the right
      materials...":GOTO 1500
```

Three more action routines are included to give you a few more ideas:

CLEAN is intended purely for the player to use the Rags (object 13) to clean the dirty Sword (object 30) and then learn a clue by examining the blade.

CUR or CHOP is meant for the player to create Shavings (object 23) from the Wood (object 20) for use as tinder. Thinking ahead, allowance is made for the player attempting to chop down all the trees in sight.

MAKE permits the creation of the Arrow or of Fire (object 45) using the Tinderbox and Steel...providing the box is filled with Shavings (flag F%(3)=1).

To use MAKE requires an additional line in the Validate routine at line 2115. If the verb MAKE is recognized (V%=37) then the checking to see if the specified Object is present must be jumped. If MAKE ARROW is input then obviously the Arrow is not present...yet.

Let there be light

Many adventures call for the use of a lamp to see in the dark realms of cave or dungeons. Often the light will only last for just so many moves. The player then dies or has to refill the lamp with oil.

How do we detect whether a lamp is lit? One easy way to have a simple routine to check for this near the beginning of the 'game loop'. I have moved the printing of the location from line 1120 and inserted such a routine.

```
1 REM ** LIST-33
1115 IF F%(10)=0 AND (L%>29 AND L%<36) T
     HEN PRINT #1,"There is too little l
     ight to see...":GOTO 1500
1120 REM
1125 IF OP%(9)<>-1 AND (L%>35 AND L%<41)
      THEN PRINT #1,"The darkness is alm
     ost tangible, there  appears to be
     no feeling of movement    or direct
     ion...":GOTO 1500
1130 REM
1135 REM
1140 REM
1150 PRINT #1,L$(L%)
```

Line 1115 checks the 'lamp lit' flag (F%(10)) and the location, if the lamp is not lit where it is needed, then the program jumps the 'location' and 'objects visible' routines direct to the input request. The player may move but cannot see where he is, or what is there.

Line 1125 serves a similar purpose in different locations where a magic Helm must be worn (OP%(9)=-1) for the player to see anything. The REMs are lines in which you may insert any extra lines of your own.

If you want to limit the number of turns a lit lamp may be used, then something like IF F(10)=1 THEN FF% =FF%+1:IF FF%>100 THEN XXXX may be used where XXXX is a routine such as 16000.

Think ahead

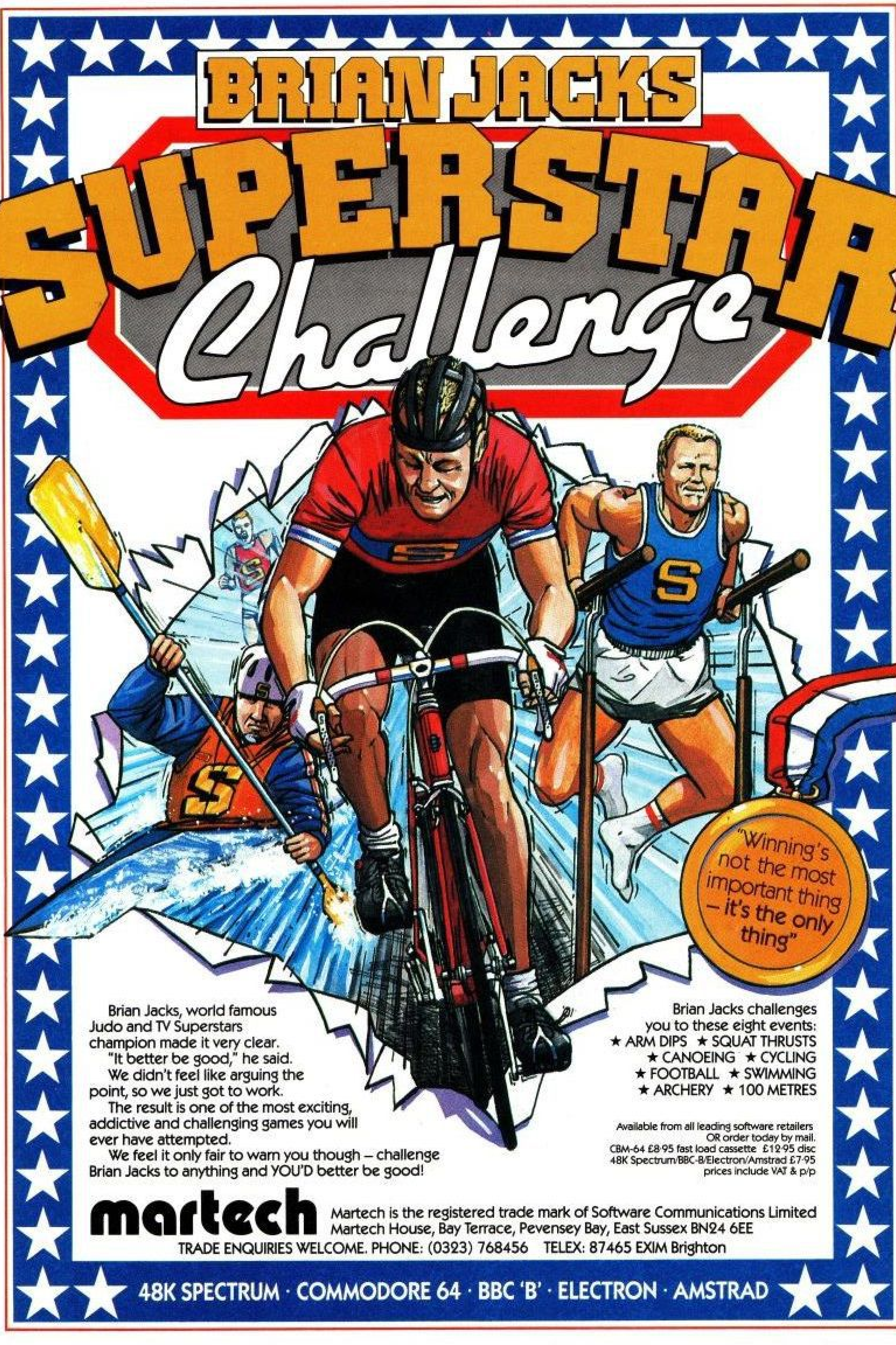
Never forget that your opponent - the player - is going to try anything he can to 'crack' you adventure. Always try to be one step ahead, allow for the attempted assassination of the Princess.

Remember too that the player is not clairvoyant, there must be clues, however devious, available to point the way through to a satisfactory conclusion. A good adventure game is like a good crossword - when you solve a clue, the feeling must be there of: "Why that's obvious, why didn't I see that before".

Error messages

Line 665 was shown as ending with GOTO 960, this should have been GOTO 1500. A delay at this point is unnecessary...sorry.

ACU


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TECHNICIAN TED

Introduction

Many words can be written about the wonders of Technician Ted. To detail every last piece of information would need the space of the entire magazine and I do not intend to go quite that far.

My assumption is that anyone who plays Technician Ted already understands the principles of the game and are quite capable of moving quickly around the playing area.

It is necessary to pass through some difficult rooms quite often (for "The Cloakroom" and "The Boardroom") and in the general hints section I have outlined the method that I found to be the quickest and most suitable time is of the essence.

Following on from general hints, I have detailed each task and the route that I considered the quickest to the next one. You may, of course, find a better way. I have also outlined most of the changes that are made to other rooms when you complete some tasks, particularly appearing or disappearing platforms.

I have been fairly comprehensive in instruction, but it all means nothing unless that player has an aptitude for this type of skilful game and can see opportunities that will save a little time here and there.

Good luck.

General Hints

1) Good use of the pause button will save a lot of time when planning each screen, use also when critical positioning is required.

2) Often, particularly later in the game, the easiest way to save time is to deliberately lose a life. Be careful with this ploy because there are magaquick tasks right up to number 16 where you will need over half your lives left to allow you enough time to complete the task. After number 16 use this method as much as you can. Remember, after losing a life you always appear at the same place as you first entered that room -that's the secret.

3) In some rooms, it is a good idea to leave and immediately re-enter at strategic points. This is related to Tip number 2 because, if a life is lost, you will simply appear at the last point you entered that room.

4) The only way of getting to the bottom of "reception" in order to make "The Cloakroom" easier is to drop off the conveyor as you leave "Call him sir" and move immediately right to jump onto the second platform down and into "The Cloakroom". Immediately, move back into "Reception" take one pace only and jump into the corner of the main rectangle. From there, you can drop a little at a time to the bottom.

5) On entering the bottom left of "The Cloakroom", drop immediately into "The Photocopier" and then onto the second platform down. Now jump back onto "The Cloakroom" and walk to the first gap in the platforms, waiting for the filing cabinet to return before jumping straight up and letting it pass underneath. Now walk right, jump over the next gap in the floor, and out into "Silicon Slice Store".

6) "Danger high voltage" can take up a lot of time unless you perfect the method of jumping through the ladders without stopping.



7) "The Boardroom" can often be used as a short cut if you are brave enough to risk the fire extinguishers at the top. Get to the top of the ladder, await for the fire extinguisher to hit the ladder and follow it as close as you can. Jump each gap in the floor and if you are still close enough, you will be able to jump the fire extinguisher as it starts to go left again. Now jump up onto the task box and out into "Reception".

TASK 1 "Ted's Desk"

This one is quite easy: simply jump around the platforms hitting both flashing boxes.

Get to the bottom of the screen, move left to "Call him sir" and drop into "Reception". Get to the bottom of "Reception" and go right, through "The Cloakroom" to the next task.

TASK 2 "Silicon Slice Store"

Moving objects now appear in this room.

You can do this task without hardly any stopping. Jump up the right hand set of platforms, avoiding the objects, to hit first flashing box. Still working up the platforms, go out of the top of the screen into "The Canteen". Move left and drop through the gap in the floor to hit the second flashing box of Task 2.

Completion of this task inserts a ladder in "Reception" which is of use later.

Jump back into "Canteen", move left throgh "Ted's desk" into "Call him sir", down to the bottom of "Reception", right into "Cloakroom", down to the bottom of "The Photcopier", left into "The Boardroom", two jumps up the ladder and left into the next room.

TASK 3 "Slice on Furnace" (megaquick)

Use the pause button here for a slightly faster completion of the task.

Position Ted with rear leg just off the ground after taking one pace only. Jump left and you should be on the second floor which will enable you to jump the rolling square and hit the first flashing box. Completion of the task is now straightforward.

Drop to the floor, go up the ladder, out of room into "Factory Gates" and make your way to the lift by going to the "Canteen" as before but go right from there, across the top of two screens until you reach the lift. Hit number 5 and go bottom left for two screens.

TASK 4 "Fuming Cupboard" (megaquick)

Moving objects now appear in this room.

Move to the left of the green block and jump up twice. Wait for the yellow fireball to move over your head to the right, jump up, take two paces left and jump up once more. You should now be on the lowest "Beaker". Jump over to the second "Beaker", wait for the magenta fireball to go left and immediately jump onto the platform to hit the first flashing box. Walk to the edge of the platform, jump left, drop off the top "Beaker" that you have just landed on, and walk to the far right until you drop off the conveyor. Just before the yellow fireball reaches you, jump up and follow it until you are directly below the central "Beaker" at which point you must jump left then straight up. You should be on the central "Beaker". From there you can jump left up to the second flashing box.

If you have lives in hand, lose one now and you will appear at the bottom right of the screen (see Hint 2).

Completion of this task inserts a platform in the "Clean Room" next door.



TASK 5 "Clean Room" (megaquick)

Jump up the left hand side of the green structure, wait for the red hazard to move up then walk right and jump onto the new platform to hit the first flashing box. Immediately, return to the left to hit the second box.

Move out of the top, into the lift, hit number 4 and move out of the bottom left into the "Acid Bottle Store". Very careful timing and positioning is necessary here to work to the far left and out of the bottom of the two exits.

TASK 6 "Silicon Etching Tank" (megaquick)

Moving bottles now appear in this room, making it very difficult.

This is a good candidate for pause button (see Hint 1).

Jump up twice, jump left, get to the edge of the platform and position Ted with legs perfectly together. Wait for the first bottle to just hit the top and walk off the platform. If you have timed it correctly, you will just get under the bottle from which point, jump


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to hit the first flashing box and the second bottle will disappear. Carry on left to the second box.

If you have lives in hand, lose one now (see Hint 2) and go back through "The Acid Bottle Store" to the lift, but stay on floor number 4 and work you way back across the top of two screens until you reach "The Canteen".

TASK 7 "The Canteen"

This is very easy. Simply jump left until you hit the first flashing box, then jump right until you hit the second.

Completion of this task makes the penny farthing cycle disappear from "The Photocopier".

Go back to the lift, hit number 2 and leave at the bottom. Using Hint 6, move through "Danger High Voltage" and then through "Bay 7", "Main Corridor", "Photocopier", out of the top of "The Boardroom" (by using Hint 7), right out of "Reception" and down the first gap in the floor of "The Cloakroom".

TASK 8 "The Photocopier"

Avoiding the fireball, jump to the right until you hit the first flashing box, then left, down the platforms and right to the second box.

Completion of this task inserts a cup and saucer into "The Tea Machine".

TASK 9 "The Boardroom"

On entering the room, jump up to hit the first flashing box and then, using Hint 7, get to the top of the screen for the second.

Completion of this task has removed a very important platform from "Slice Surface Abrasion" which means you cannot now enter that room from the lift to do the task. But there is another way; just follow the route below.

You can lose a life here if you have some to spare. But, anyway, you must move along the bottom of "The Photocopier" and two other screens until you reach the lift. Hit number 5 and go bottom left until you reach "The Fuming Cupboard". Make your way up to the gap at the top left of the cupboard, walk left, and jump as you leave the gap. You will appear in "Abrasion Dust Extraction". Go up the ladder inside the building and jump off to the right, being careful not to hit the flashing box. Continue right to the next screen.

TASK 10 "Slice Surface Abrasion" (megaquick)

This is now a very difficult to complete and you should practice it frequently. The pause facility may help.

As you enter from the left, jump the yellow object, move to the edge of the platform and wait for the square object to move right. Position Ted over the edge of the platform with one leg stepping into mid air. As the square and yellow objects nearly reach you, press jump and right, then jump and right again and move quickly into the wall so that the square object cannot reach you. Wait for the square object to move left three times and on the third, follow it for about two paces, turn right and jump into the flashing box, you should be half way up the box. Immediately, turn and jump left to follow the square object, positioning Ted on the edge of this platform as you did the other one. As the square object returns, jump left twice, follow the yellow object and jump to hit the second box just as you are leaving the screen.

Work your way to the bottom of "Abrasion Dust Extraction" by jumping the televisions, move up the left hand ladder into "Wages", wait for the magenta fireball to go left, follow it and jump as it begins to go right again. You should have hit the top of the £ sign in doing this which, after pressing the right button, will hold Ted still and facing right. As the Boss' head nearly hits the top, move and jump left, clearing the head and landing on the second platfrom (down of the £ sign. Now work right and drop through the gap in the floor.)



TASK 11 "Laser Slice Separation Plant" (megaquick)

This is quite easy. Hit the flashing box as you drop into the screen, work you way fully left, drop down, then fully right to the second box.

Go back to the lift, hit number 2, lose a life (see hint 2) and move bottom left for three screens but move back into "Bay 7".

TASK 12 "BAY 7" (megaquick)

Practice this screen a lot; timing is critical.

Start from the left hand side, jump up to the first flashing box and immediately carry on to the second.

Completion of this task inserts a platform in "Microchip Mounting Furnace" which is of use when escaping from Task 16.

Move out of the top to the right until you reach the lift, hit number 3 and move out of the bottom left.

TASK 13 "Microchip Mounting Furnace" (megaquick)

Move left onto the conveyor and jump left onto the white platform following the blue fireball. Jump the fireball, then onto the first flashing box. Immediately, jump back over the bottle and make your way to the second box avoiding the fireball and the other bottle.

Completion of this task inserts a platform in "Microchip Mounting Furnace" which is also used when escaping from Task 16.

Here you should definitely lose a life, otherwise the escape route is such a long way round that you would lose too much time. Go to the lift, hit number 2, work your way left to "Bay 7", drop through the gap in the floor to the "Stairway" screen without a name, drop to the right and into the "Tea Machine" at the bottom.

You can, of course, get to the "Tea machine" by hitting floor number 1 in the lift, but on entering from the right, a yellow cup and saucer makes life very difficult.

TASK 14 "The Tea Machine"

No problems here. As you enter from the left, jump to hit the first flashinhg box. Move right, jump into the large teapot shape (following the cup and saucer) turn left and jump into the wall of the teapot. Jump left twice more and you should hit the second box.

Completion of this task inserts some "Beskers" into the "Beaker Store".

Go left into the stairway room, out of the gap at the left edge and through the "Beaker Store" any way you find successful. Jump across the top of "Power Cables" avoiding the green penny farthing cycles, out into "Power Generator". back into "Power Cables" jump across all of the conveyors, drop to the floor and go left (being very careful of the moving head) to the next task.

TASK 15 "Ther Power Generator"

This is quite straightforward. As you enter, you automatically hit the first box. Now work up the ladder and left to the second box, being careful not to jump from too near the edge of the screen or you will fall to your death in the next task.

Completion of this task inserts several moving objects in "Under a Diffusion Furnace". You must tackle these to enable exit from the top left platform. Practice the screen until you can escape with hardly any stopping. Other routes take too much time.

Having entered "Slice Diffusion Furnace", work right, through five screens, to the lift. Hit number 3, lose a life if you have some spare, move through the bottom of "Microchip Mounting Furnace" and, just as you reach the left hand edge, jump into the next screen.

TASK 16 "Electro Plating Bath" (megaquick)

This is the final megaquick task. If you have plenty of lives left after this one, then you can use the 'lose a life' hint more often.

Having jumped into the screen, immediately jump left again which will leave you on the second step down. Immediately, turn right and position one leg into mid air. Turn left and jump, drop off the edge of the "Bath" and walk towards the first flashing box. Wait briefly until the red fireball reaches centre screen, walk through box to the other edge of the "bath", jump up twice (avoiding the red fireball) and onto the top left platform. Immediately, jump onto the conveyor, over the silicon slice, up to the second box, over to new platform and out of screen.

Completion of this task inserts a framework in the "Quality Assurance Department".

Move across the top of "Microchip Mounting Furnace" to the lift. Hit number 5 and move out of the bottom, through three screens to "Quality Assurance".

TASK 17 "Quality Assurance Department"

The new hammer shaped framework enables both flashing boxes to be reached quickly and easily.

Lose a life immediately after hitting the second box and walk right, through the next screen, to "The Fuming Cupboard". Jump up to the exit at the top left and then jump into the screen above.

TASK 18 "Abrasion Dust Extraction"

Move up the central ladder to the top platform and walk right, just past the flashing box. Turn and jump left hitting the box. Another hazardous object now appears, so be careful. Work your way to the bottom of the screen by jumping the televisions, and walk right until you are one pace, from the wall. Position Ted with legs perfectly together, wait until the magenta fireball nearly hits you then press right and jump together. You should land on top of the wall where you can follow the silicon slice to the second box. Lose a life immediately and you will appear at the foot of the left hand ladder.

Completion of these tasks inserts a framework in "Mathews Lair". Jump up the ladder, move left into "Wages". negotiate the screen as before except, this time, go out of the left hand platform. Work up and down the platforms in "On Top of the Factory", moving out on the second platform up, through "Electric Conduit Tubing" to the next task.

TASK 19 "Matthews Lair"

With the new framework it is quite easy to hit both of the flashing boxes.

Completion of the task replaces the penny farthing cycle in "The Photocopier". This means you have to go a slightly longer way round to the next task.

Leave "Matthews Lair" on the first platform, go back two screens to "Wages": and through the gap in the floor. Follow the same route as after tasks 10 and 11 back to the lift, hit number 2, lose a life, move out of the bottom and on to "Bay 7". Drop through the gap in the floor, moving left, through the "Beaker Store" and "Power Cables", up the ladder in the "Power Generator" to "The Boardroom". Using Hint 7, go out of the top where you can now use the ladder that was put in "Reception" all that time ago. Jump up the ladder.

TASK 20 "Call Him Sir"

This task can be done in more than one way, but be patient. Practice and use the method you find to be easier for you, but make sure that when it is done, you go out of the top of the screen into "The Fire Escape".

Completion of the task takes the brickwork away from the first flashing object in "Wages".

In the "Fire Escape", let the yellow fire extinguisher pass left over your head, jump right onto the wall, follow the cyan fire extinguisher, then jump so that you can leave the screen. Go through "Quality Assurance" and "Slice Separation Plant" and jump up to the gap in the "Fuming Cupboard" as you have done before. Now jump up to "Abrasion Dust Extraction" and move up the ladder to "Wages".

TASK 21 "Wages Department"

At last, the final task. By now you should be able to handle this one okay. The only difference is the missing brickwork, but you will easily overcome that little problem to finally complete 21 tasks.

Completion of the task inserts a platform in "The Picket Line".

FINAL MISSION

You might have known that there was more to come. In fact you still need at least an hour of time left to stand any chance of finally completing Technician Ted.

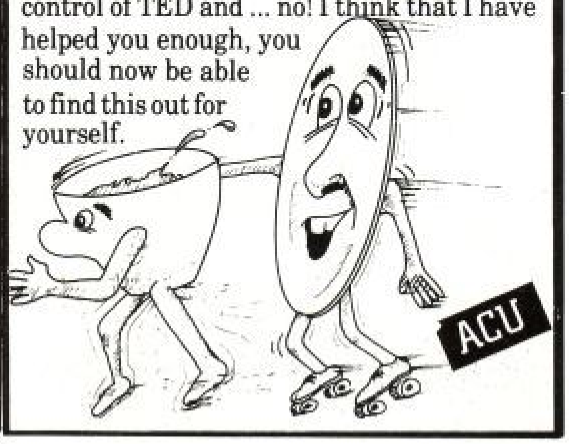
Work your way all the way round the factory, as you did after Task 19, until you can jump up from "Call him sir" to the "Fire Escape". You can now see why you have had to go so far to get here. All of the bottom half of the screen has disappeared, except for the fire extinguishers; making it impossible to get out of the left hand side of the screen unless you have entered on the left side of the hazards.

Move left into "Tradesmans Entrance", up the ladders and down the left hand side of the brickwork where you will drop into "A bit of fresh air". Avoiding the fast cup and saucer, exit to the left into the "The official Union Flag" and jump the hazard in order to drop into "The Picket Line". The new platform stops you falling to your death.

You may think that he green "T" shapes are deadly, but in fact only the right hand one will kill you.

Walk through the Left "T" and jump into a new screen called "Okay, Where do I get my reward". Negotiate this screen by jumping and avoiding the objects, but be careful at the bottom because you cannot stop or change direction due to it being a conveyor belt.

Well, the next screen really is the last one. As you enter to collect your money, you lose control of TED and ... no! I think that I have helped you enough, you should now be able to find this out for yourself.



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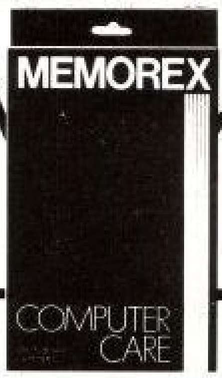
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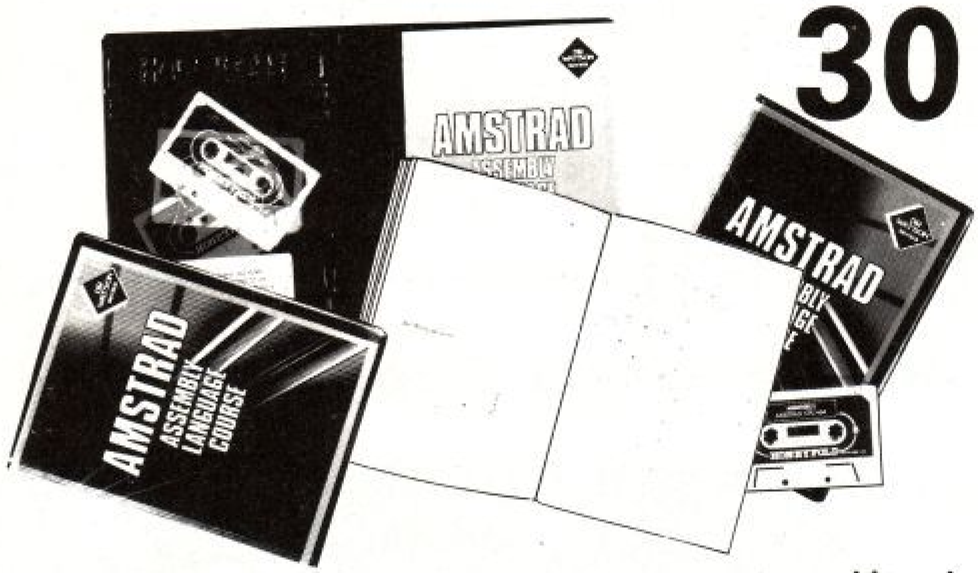
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2. There is no limit to the number of entries any individual can make.
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5. The judges' decision is final. No employees of Amstrad, Amsoft, or Amstrad User, nor their relatives may enter.

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Clues

Down

1. Your favourite computer company (7)
2. Line numbers for cars (4)
3. After a while (4)
4. 464 or 664 (3)
7. Endeavour (3)
9. Recent (3)
10. Not very bright array (3)

Across

4. Douglas Adams' "Bunch of Binary Bits" (8)
5. Feline directory (3)
6. You can't interrupt this (2)
8. Roland's best friend (7)
11. Could be anything (3)

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Address ....

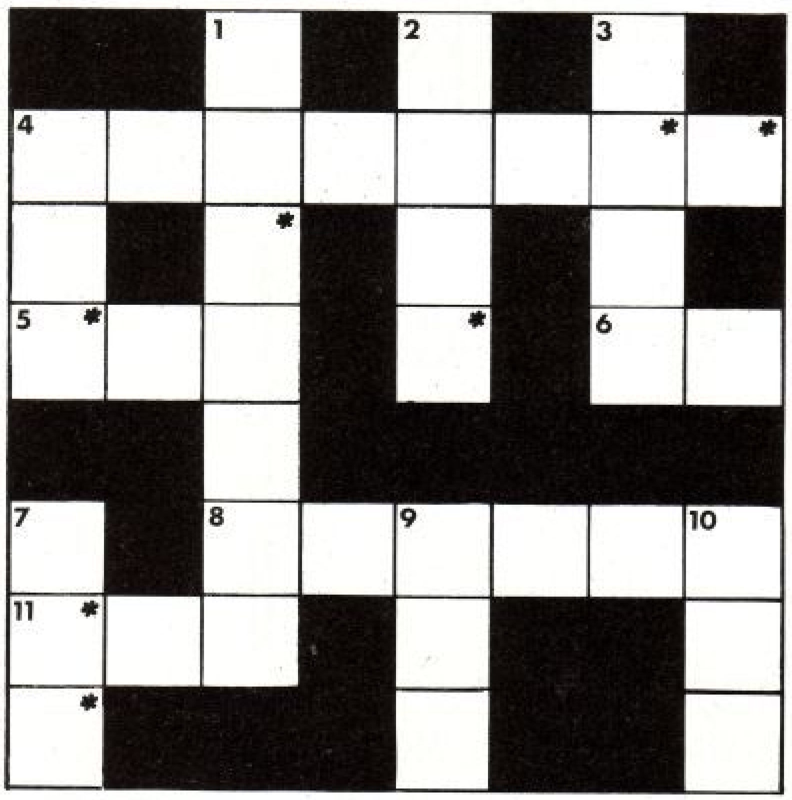
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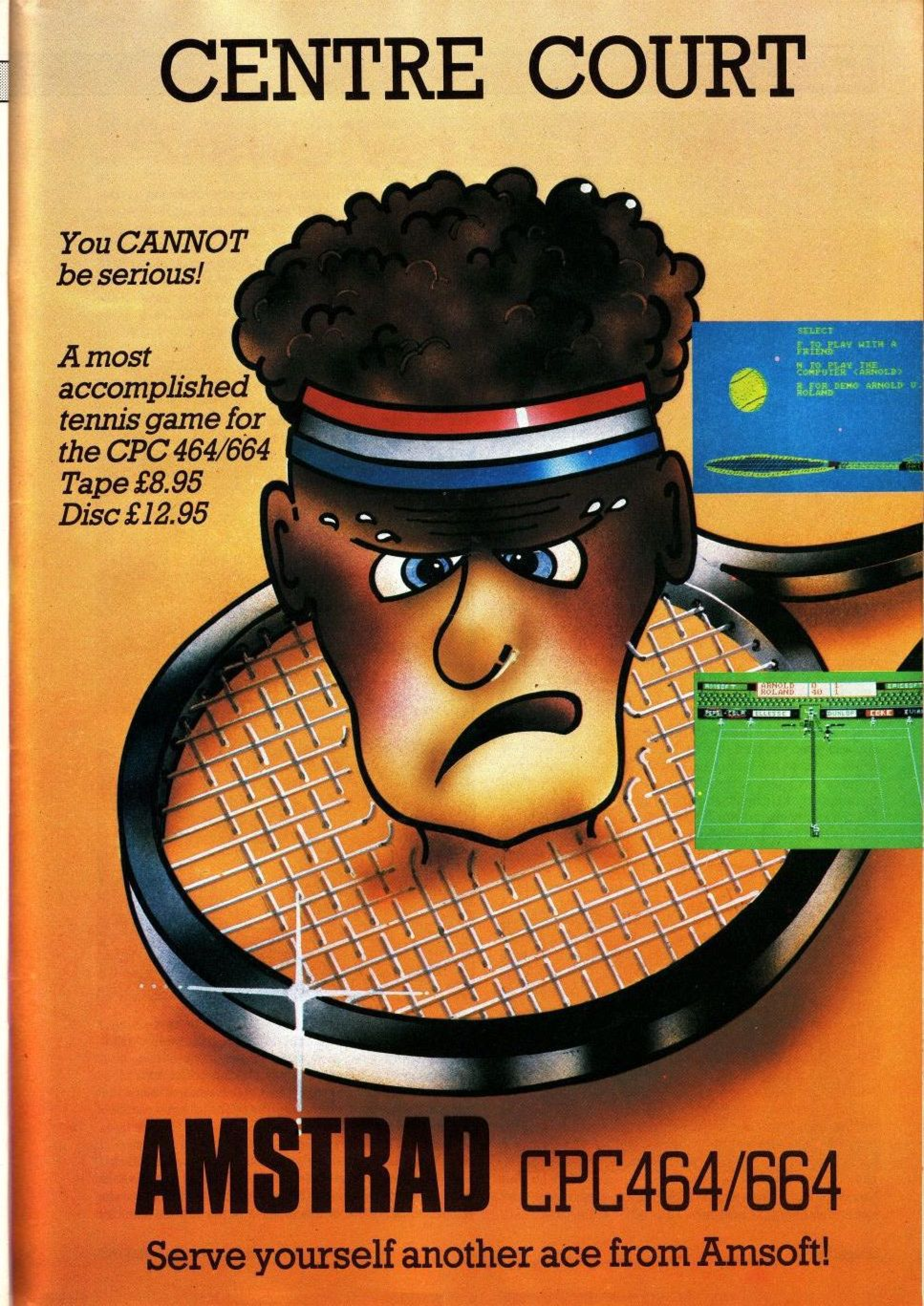
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Software reviews

Game of the Month

ALIEN 8

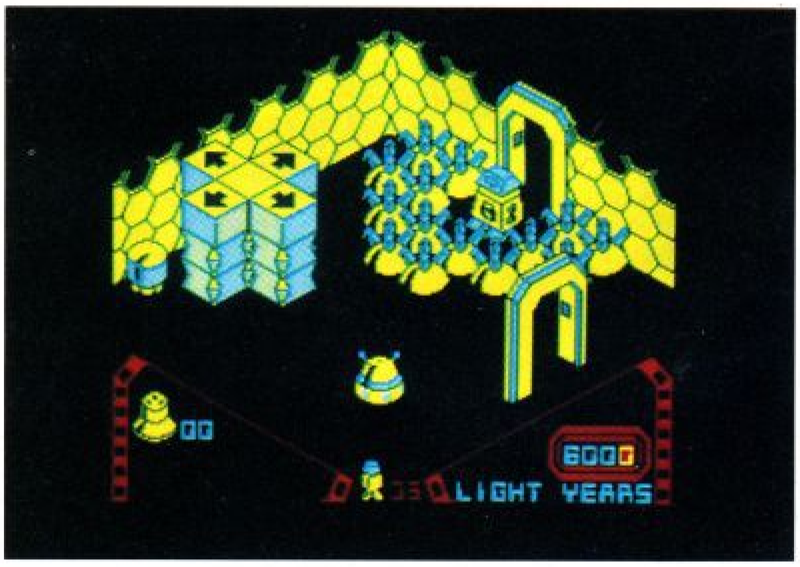


Ok, before anyone else says it, 'ALIEN 8 is virtually identical to KNIGHTLORE on the Amstrad machines', but that's the last time you'll ever hear me say it -because it simply isn't true. I'm sure there will be no end of correspondence to this and other magazines along the lines of '... I just shelled out another £9.95 on ALIEN 8 and when I got home I found it was KNIGHTLORE with modern graphics'. You, the discerning reader, can sit at home and chuckle when you read this kind of uninformed comment - it is obvious that the author has not sat down and played the game for any length of time. I will concede that the graphical technique that Ultimate employ in the two games is similar, but the gameplay is quite different. Anyway, why give up on an idea that is so far ahead of any other games technology - I hope Ultimate have as much success with this game as they are already having with KNIGHTLORE.

Propaganda over, on to describe the game... In ALIEN 8, you play the title role, cast as a cute robot who must go round a large space ship re-activating the sleeping cryonaughts before the ship drops out of hyper-drive and becomes open to attack or finally falls out of orbit and crashes into the planet that the ship has been travelling toward for aeons past. This rather flowery description is typical of Ultimate's slick packaging and as usual, leaves one wondering just exactly what it is you're supposed to be doing. The truth of the matter is that you must find the various shapes of 'thermolec valve' (domed, pyramidal, square and cheese shaped) and take these to plug them into the cryogenic sockets, each of which flashes the shape that it requires for activation and will not accept any other. There are 34 valves and 24 sockets, so it won't be necessary to pick up all the valves if you find any are particularly difficult to get. It is only possible to carry three at any one time, so it is sometimes wise to plan the order in which to reactivate various chambers so that you don't end up carrying an otherwise useless object from one end of the ship to another.

As in KNIGHTLORE, the rooms are produced in two colours on black, which, with stippled shading, give far more depth to the rooms than has been produced on certain other machines. Most of the two colour combinations used consist of a pastel and a bright version of one particular colour, however, activating a chamber gives a very satisfying red/white colour screen that somehow seems to make all the work worthwhile. And some rooms do require a large amount of brain work before the seemingly obvious solution eventually presents itself.

There are a number of different hazards that may present themselves, the obvious ones are the dalek like mice, the clockwork mice and the sparkling blobs that just don't mind who they push around. More subtle are the blocks on which you may experience a magnetic effect that tries to pull you off towards a nearby hazard, or the blocks that explode on contact (similar to U NO WOT) allowing you to fall onto whatever happens to be below. Static death traps include the alien egg shells, tubular spiky mats, deadly pyramids and unexploded mines that are often to be found in a room that also contains a 'Robodroid'. What's one of those? I hear you ask, well, it's basically a second robot that you may take control of. In the rooms where they are to be found, there will also be a set of five blocks, four of which contain arrows pointing in the Cardinal directions, step on one of these arrows with ALIEN 8 causes the droid to move in the direction indicated. The droid is not killed by the mines unlike yourself and can therefore be used as a sweeper to clear an exit, or access an object. If the mines are too high, then place an object on top of the droid before you begin to move him and he will clear both levels at once.



On dropping the correct valve in a room containing a cryogenic socket, you find that the object is drawn towards it, this is often very useful. Sometimes you may be able to hitch a lift on top of it, to get you across a bed of spikes or the effect may be used to place an object in a socket when it seems that you can't just drop it while standing on the socket (because of limited headroom).

In several rooms, you may find a pile of blocks with chambered corners, these can usually be man-handled to your advantage - to provide a higher platform to cross some hazard or access one of the valves that would otherwise remain aloof. Some of the piles must be toppled across a

flight of deadly stairs to access whatever is at the top.

On screen, the display shows how many chambers have been successfully activated so far, the valves you are currently carrying, the number of lives left and a countdown of the number of light years left until the planet is reached, by which time all the chambers must be reactivated. For those of you who are impatient to see the final graphic effect of the game, a program to enable several pokes to be entered into the game is listed elsewhere in this issue. Personally, I think the effect that one sees after failing to complete the game is more interesting - under a screen euphemistically entitled 'Reprogramming' -your robot is beaten about the head and body with a walking stick and boxing gloves - truly brilliant. Whether you complete the game or not, you are told the number of chambers that you managed to activate and also, the number that you didn't accompanied by the number of cryonaughts lost. A rating of 'poor', 'average', 'fair', 'good', 'excellent', 'marvellous', 'hero' or, the ultimate, 'adventurer' is also given.

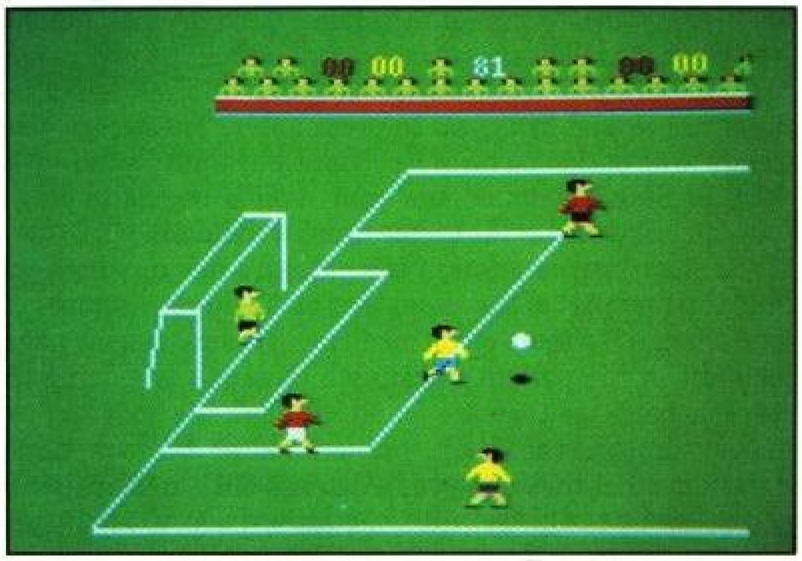


If you already have KNIGHTLORE, I still would not hesitate to recommend this game, if you don't, WHY NOT ? -I suggest you hock the family silver and rush out to by a copy of ALIEN 8 immediately. If I had to pick one of the two games, I think I'd probably go for ALIEN 8, because I always find the transmogrification in KNIGHTLORE to be a little un-nerving, though I naturally have a copy with the effect POKEd out.

I don't think it would be wise to give star ratings for this game, there isn't room for enough of them, besides which, comparison with any other game on a basis of star rating is not really possible - these two programs leave absolutely everything else standing. Assessing this game on a basis of star rating is not really possible

WORLD CUP

I've never really thought that a computer really lends itself to a simulation of football, unless, of course, you happen to be 11 part schizophrenic. World Cup from Artic, however, still provides a reasonable game if you try and forget what it is really trying to be like. In play, each side has 5 players -obviously these cannot all be controlled at once, so you only get to control the player who is nearest the ball at any time. The currently active player is indicated by a change in colour of his shorts. This is the most annoying aspect of the game: you're just about to move a player into a good defensive position when the ball rolls a little closer to one of



your other men and you must quickly react to move him to the correct position instead. This is fine when the game is played against a human opponent who has an equal reaction speed, but when playing against the computer, it always seems to be one jump ahead of you.

The ball casts a shadow on the ground which gives a pseudo 3D effect and the goal markings at either end are also drawn to give a 3D view. Unfortunately, in mid-field, the game tends to look very 2D, this is not helped by the fact that the players don't look at all 3D either. Surely in the sixteen colour mode that the program uses, a little bit of shading could have been included to enhance the effect. Another irritation of the game is the fact that the moving objects are exclusive ORed into place - causing all sorts of interesting multi-coloured patterns when two objects cross. The game does have some redeeming features: the crowd noise is well done and the provision of a demo mode always enhances a game. I think however that I'd rather use the money to see some real football.

AUTHOR	Artic
PRICE	£7.95
GRAPHICS	***
PLAYABILITY	**
ADDICTIVENESS	**
OVERALL	***

FANTASTIC VOYAGE



Fantastic Voyage by J R Edwards is another drive around the maze game. The plot consists of your being the

microscopic doctor implanted in an incredibly sick human; your task is to fight the infection that periodically threatens the human's life. On loading, the game informs you of the keys to use and asks you to press enter. The screen then clears to an option menu of Keyboard, Joystick, Redefine the keys or Start the game and your Arnold begins to play a melodious version of the theme from Dr. Kildare.

You start your mission in the patient's mouth where you find the first part of the seven that make up your submarine and offers you a route out of medicine. This submarine has to be built in the patient's brain which requires moving the various parts, as they are found, through the body. As you move through the body you encounter various minor infections that threaten your existence but not the patient's -these can be easily shot with your laser.

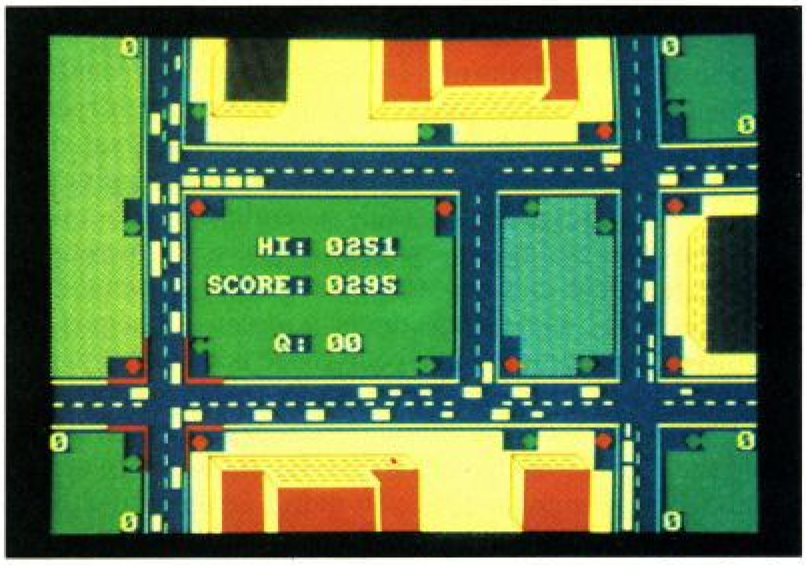
The main aim of the game, apart from escape, is to prevent the patient from dying. The patient's death can come about from various diseases but, by means of a map of the whole body, your information display shows you the exact position of the infection. If you do not reach the infection in time, the patient's temperature rises slowly at first but increases the longer you allow the infection to build up until he dies, ending the game. If you have tackled enough illnesses to reach the high score league you are presented with an option to enter your initials.

The movement through the body consists of a graphic display in mode 1 that shows your current position, for instance, the right hepatic vein. There is always a definite route through the section of body that you currently reside in but it may be blocked with cholesterol, in some places this can be shot, in others it presents a block to your route resulting in the need for a detour. The main comment about the display is that the patient seems to be "wired up" very strangely indeed. If you proceed down the hepatic artery then turn to the left, you enter the left kidney; if you then return to the hepatic artery and proceed downwards and take the next left, you enter the right kidney. There also seems to be two bladders since you cannot exit from the left kidney into the bladder and then exit from the bladder to the right kidney, but you can enter another bladder from the right kidney. A point I disliked about the game was that if you did not bump into enough red blood cells, rather than just losing a life, you went first red then invisible - which in a maze game makes it very difficult to drive around. I would have preferred to have been docked a life, which I tended to do deliberately to restore myself from invisibility.

Another annoying aspect of the display was that a beep was issued at each change of screen. There appeared to be no means to turn this off, although, as a redeeming feature, the screen display scrolled very quickly as each new area was entered. Also, on the subject of the screen presentation, there was the status display which showed with a single pixel marker where in the body you were currently situated and when an infection appeared with a character marker, where the infection lay.

AUTHOR	Amsoft
FORMAT	Cassette
PRICE	£8.95
GRAPHICS	****
PLAYABILITY	***
ADDICTIVENESS	***
OVERALL	****

TRAFFIC



Now here's a different type of game. Ever wondered why Hyde Park Corner was such a jam ? This game will deepen your awareness of traffic congestion and your sympathy for coppers on windmill duty. You are given the job of controlling the lights in various parts of the city of London, a job normally done by a little grey box that sits by the traffic lights and changes them to red when it sees your car. Unlike the real traffic lights, you have to keep the lengths of the tailbacks to a minimum. Quite simple really isn't it? No, it isn't.

Ah, you think, this is simply a matter of whizzing round with your joystick, changing the lights as fast as possible. It just doesn't work that way. Some cars have little indicators on and are only content with travelling in that direction. Of course, you have to unblock the right exit first. This requires a strategy. Things are made easier by all the drivers being good, law abiding citizens who don't jump the lights. The scene is viewed from above, all the vehicles being depicted by various sizes of smoothly moving little boxes (what you might call a box car?). Points are scored for letting boxes across the screen. The bigger the box, the bigger the bonus. Just like one of those razzamatazz quiz shows on ITV.

When you get a largish number of points, you are given a promotion to a more difficult patch. This is not the sort of game for playing after having driven home and tackled the fast lane of the Hammersmith flyover single handed.

Like the Hammersmith flyover, the air is filled with the noise of traffic and the honks of over enthusiastic drivers. As usual, the quantity of honking is proportional to the length of the queue.

This game is for joysticks only, but it does work on a '664 and has an option for colour or monochrome but *you* try spotting a red light on a green screen. This is the sort of game that can grow on you. Unless, of course, you happen to be one of those poor bobbies who does windmill duty at Hyde Park Corner all day.

AUTHOR	Amsoft
FORMAT	Cassette/Disc
PRICE	£12.95/£8.95
GRAPHICS	***
PLAYABILITY	****
ADDICTIVENESS	****
OVERALL	****

Continued on page 65

ADVENTURE REVIEWS

Colossal Cave

There are a few versions of the original Crowther & Woods mainframe adventures floating around; and I have so far played two: this one and another by Level 9. The one by Level 9 is by far the better. Duckworth's has a few 'let-downs': no instructions; a ludicrous 'QUIT' routine and overall slow execution.

Duckworth assumes that everybody has played one of their adventures. In all the adventures I have played before, 'QUIT' meant halting the current game and letting you try again from the beginning. But, Duckworth's 'QUIT' actually clears the memory completely and you are dumped with an empty computer, and if you were intending to play again then you have to wait ten minutes or so while the adventure is re-loaded.

It's a typical adventure, with dwarves, trolls, dragons magic spells and and many caverns full of objects and treasures.

Sometimes it makes you feel like jumping for joy when you complete a previously impossible section, other times it makes you feel like picking up the computer and lobbing it through the nearest window.

Pete Gerrard (the author) has written a fairly intelligent book on how to write adventures for yourself, but in his own games he misses the finer points.

AUTHOR	DUCKWORTH
PRICE	£7.95
ADDICTIVENESS	***
DIFFICULTY	***
VALUE FOR MONEY	**

Castle Dracula

In this game, there are no proper instructions for the first time adventurer, and so Duckworth assumes everyone knows what to do. There is a short 'briefing' beforehand, however, and it tells you that you must go and thrust a knife in Dracula's chest. There isn't any treasure to collect, just Dracula to find and knock off.

It's not particularly difficult but it's the type of program that would suit the person who has cut his teeth on a beginners' adventure. There are a few zombies, hunchbacks and suit of armour lurking around blocking your path, but you can easily turn around, find another route and explore the other 100 locations.

If you 'QUIT', or are killed by a nastie then you are zoomed back to the very beginning and presented with the previously read 'briefing'. The vocabulary is very poor, it lacks synonyms and only contains the words necessary for the completion of the game. This is excusable in easy adventures but here it is irritating since everything has to be typed out in full.

AUTHOR	DUCKWORTH
PRICE	£7.95
DIFFICULTY	***
ADDICTIVENESS	***
VALUE FOR MONEY	**

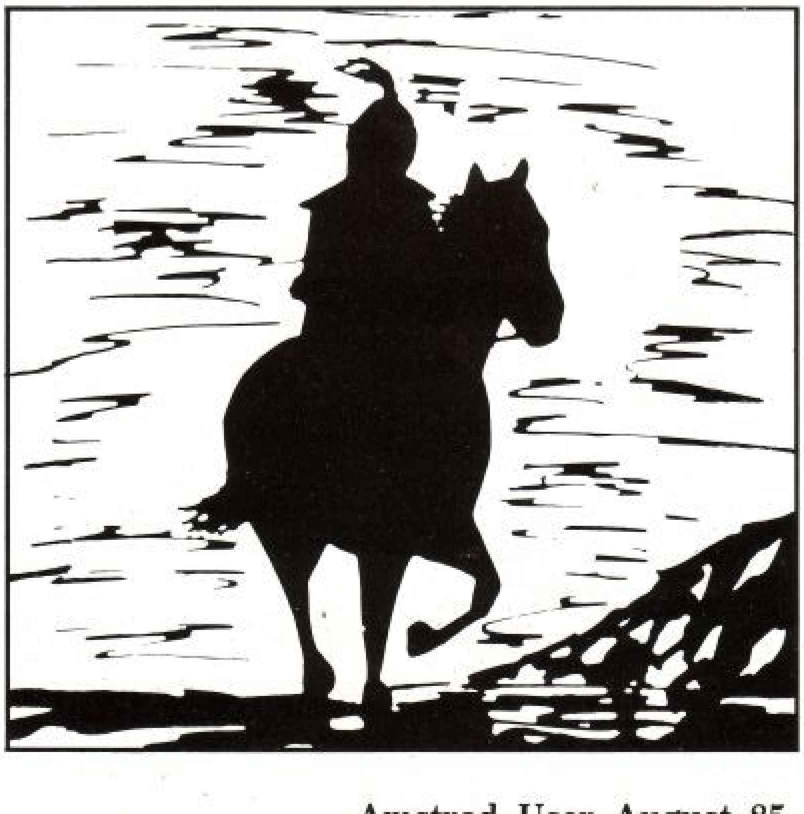
Mountain Palace

As usual you're in a distant mythical land looking for a long lost mountain palace. You've heard tales of a treasure trove inside. So far, I've found a golden mace and a sparkling tiara but the back of the box mentions vast wealth to be gained and so there must be more. After the program has loaded there is an irritating title "sequence" that masquerades as an set of instructions; worse, it crops-up several times, press Escape twice and there it is: but worst of all when you 'QUIT' the current game, you find yourself staring at it, having to read the instructions yet again.

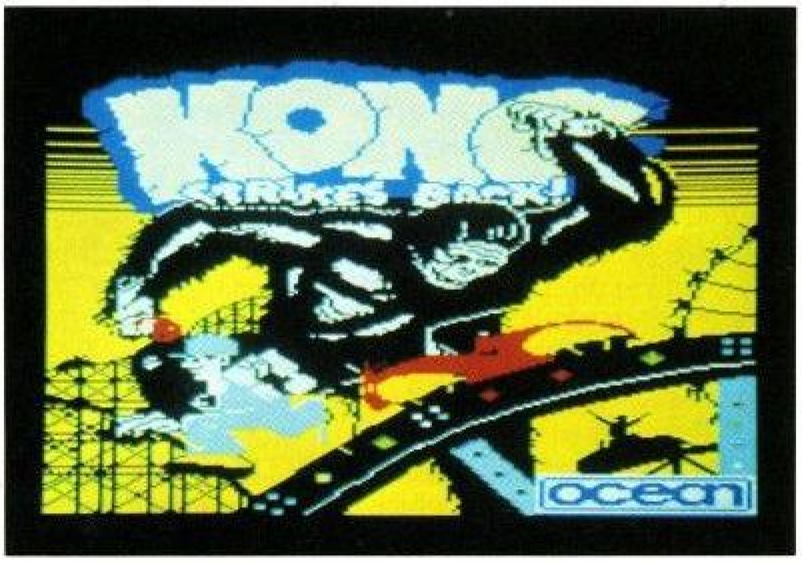
Apart from this, it's a typical adventure game. Short and sweet location descriptions, dry wit every now and then, poor vocabulary with the inclusion of the odd four-letter word.

The actual adventure isn't very hard. I should guess I completed 75% of it on my first game. Sometimes it becomes tedious because of the running speed and also because of strings of rooms that apparently are there to bulk-out the program. It's a very beginners adventure, not hard, not easy. The only let down is speed and vocabulary.

AUTHOR	DUCKWORTH
PRICE	£7.95
DIFFICULTY	***
ADDICTIVENESS	**
VALUE FOR MONEY	**

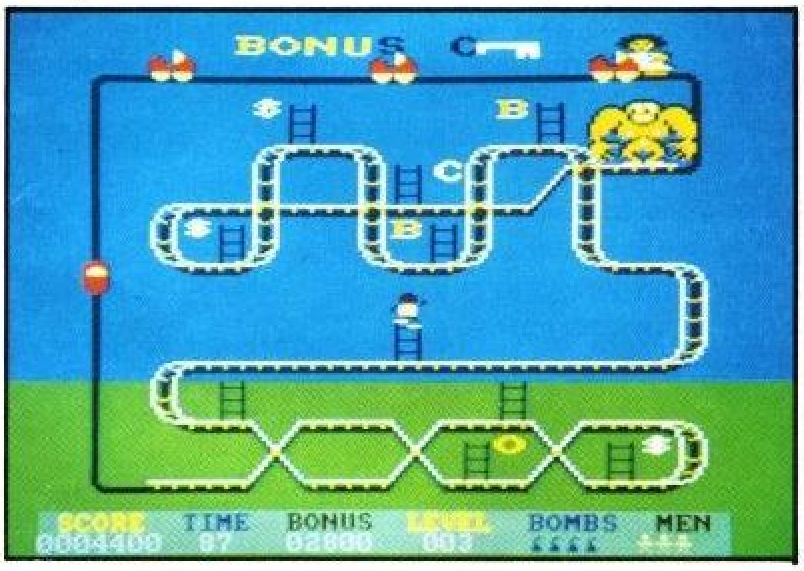


KONG STRIKES BACK



This is, just in case you have not guessed, another Kong game. This one has a rigidly immobile Kong who squats in the top right corner of a screen depicting a roller coaster doing very little striking back and watching the goings on. Also in that corner is a girl who bears more than a passing resemblance to the Esmeralda in Hunchback II. It also seems to suffer from the same sort of awful music but at least you can turn it off.

Owners of a '664 are mercifully spared the delights of this game unless they can find a version that does not use the 12% faster DJL speedloader. Games manufacturers should pay more attention to the quality of their games than to their protection schemes.



Rollercoasters resembling red clogs zoom round and round a single, twisted track in the opposite direction to you. If you should happen to bump into one of these cars there is much thwacking and splatting as you become a short range ballistic missile, get a high speed aerial tour of the screen and lose one of your four lives.

Being a good friend of the fairground owner, you blow up his cars with bombs. You only get five bombs so don't monkey about with them. To avoid the cars you can run up conveniently situated ladders which have been left lying around and the cars will pass harmlessly underneath you.

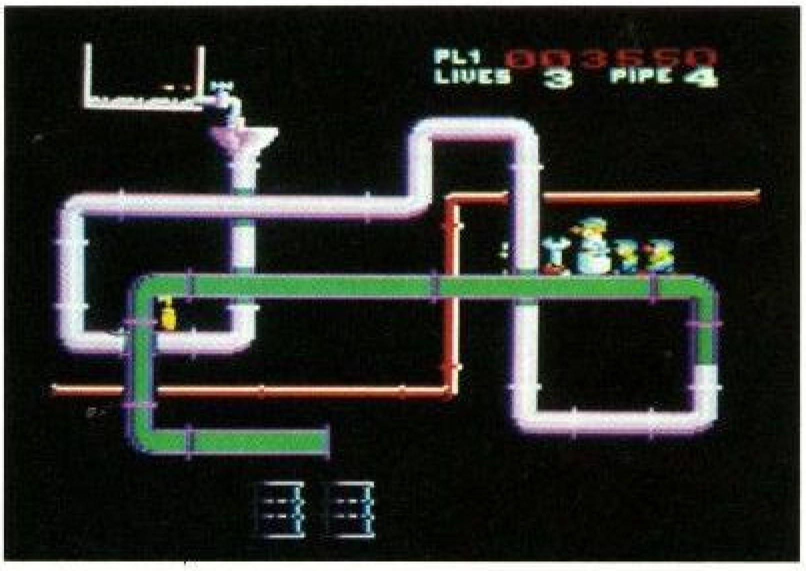
What is so boring about this game is that the whole thing takes place on one piece of track. The paths of the cars are very predictable. You can either dodge cars with ease or they get you in a co-ordinated pincer movement from above and below. The cassette cover promises other objects such as springs and balls to relieve the boredom but I played it to level four and saw none of them so I can't tell you what they look like.

You get points for blowing up cars, getting dollar symbols from the ladders, collecting the letters of the word 'BONUS', pieces of a key and for completing each screen.

This game has nothing to do with Kong except the immobile character at the top of the screen and is certainly not the 'action packed extravaganza' that the cover makes it out to be.

AUTHOR	Ocean
FORMAT	Cassette
PRICE	£8.95
PLAYABILITY	**
GRAPHICS	***
ADDICTIVENESS	**
OVERALL	**

SUPER PIPELINE II



Taskset produce some very original software, Jammin' was a program like no other,and they have lived up to their reputation by producing "Super Pipeline II". Here you have an everyday task and are faced with everyday hazards. A plumber may not be everyone's idea of a super hero, but playing the part of a plumbing foreman you have to protect a complex of pipes and fill some barrels. Being a foreman means that you don't actually *do* the work - instead you have two workers to mend the broken pipes for you. As you climb around the network of pipes you must intercept and recruit the workers. They will follow you around the pipes until you reach a leak. One worker will then fix the hole. It is a shame that both workers cannot be set to work on one hole to finish it twice as quickly.

The hazards include the usual bits of plumber's paraphernalia. Early sheets start slowly with electric drills, the odd brace and bit, and other sundry obstacles. To start with there are not many holes to be fixed, as the game progresses the pipes seem to get weaker. The number and ferociousness of the implements increases.

To aid you in protecting yourself and your workmates you have a gun. This destroys most of your foes and is best kept permanently firing. As the foreman you have the statutory three lives, the two workmen on the other hand have infinite lives, this means that a tame worker can be used as a shield against encroaching trouble. Not very good for

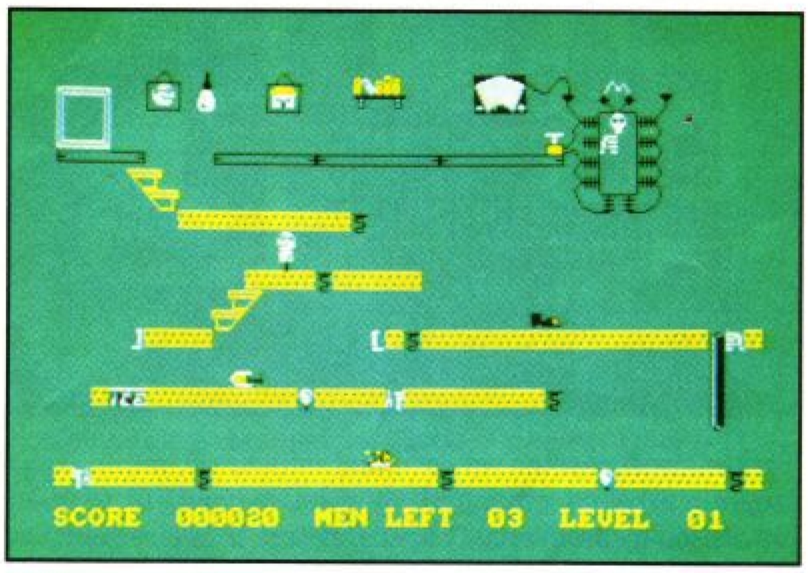
worker/management relations but useful for making the game last a bit longer.

Particularly nasty creatures include the blue lobster. This can only be shot as it moves away from you. To counter this, the best position to stand in is at the junction of a loop. As the lobster approaches you, and your men, can run around the loop and turn the beast into seafood salad. Worse than the lobster are the nails. These cannot be shot, the only course of action here is to run away.

Super Pipeline II is a very addictive game; each time you play it you are desperate to finish one sheet more than last time. The music is quite jolly and short cartoons when you finish each task add a finishing touch.

AUTHOR:	Amsoft/Taskset
FORMAT:	Cassette/Disc
PRICE:	£8.95/£12.95
GRAPHICS:	****
PLAYABILITY:	***
ADDICTIVENESS:	****
OVERALL:	****

FRANK N STEIN



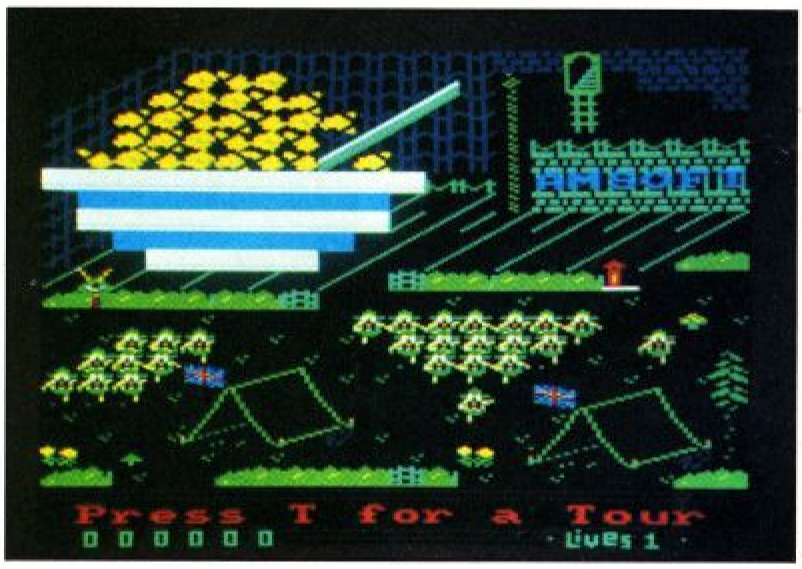
Frank N Stein loads with quite a pleasant title screen, depicting various limbs and parts of the body, each one numbered. The idea of the game is that you play the part of Prof. Frankenstein who must go round his laboratory and pick up the constituent parts of the monster he is attempting to create. These must be acquired in the correct order. Having assembled the beast, you may then push the plunger to apply the power and go on to the next screen. The format of the game is that old favourite, platforms and, well not exactly, ladders. To go down the screen, one just drops off the end of any of the platforms. To get back up again, you must position yourself over the small springy platforms and then push the 'fire' button, this sends you hurtling back up to the platform above.

My major moan about the game is this particular aspect; unless you are pixel accurate in lining up with the springing platforms, they fail to work. This is made all the more difficult when one of the inevitable nasties is hounding you across the screen. The screens are designed in such a way that there is only one path that can be guaranteed to get you through a screen -finding it, is another matter. With only three lives, it can be a long and tedious process to determine the best way through any particular screen.

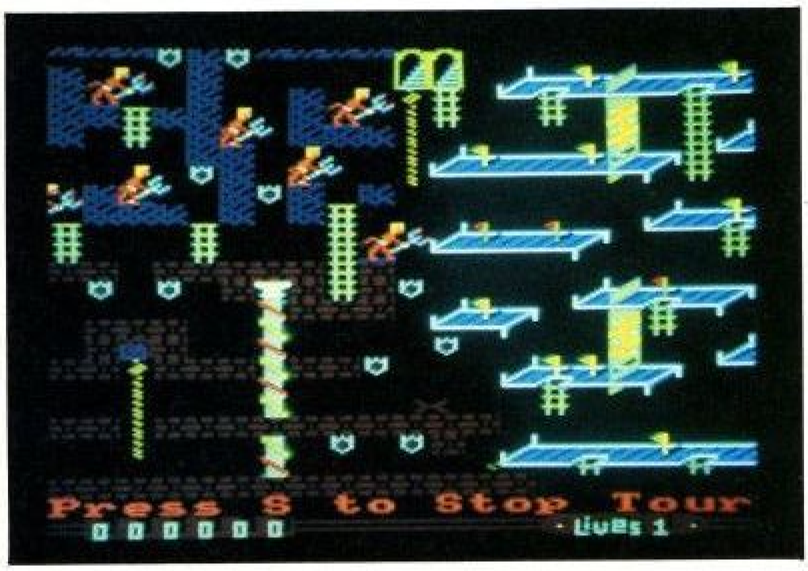
As well as the deadly moving sprites, other obstacles may hinder progress; such as light bulbs which hold you in a fixed position for a second or two, allowing the pursuers to catch up with you. Patches of 'ice' are interesting, you tend to slide across them on your bottom. There are some places where you must slide down a pole to go down the screen; this is achieved by lining up with the top of it then pressing the 'fire' button. Once again, it can prove a little difficult to get exactly lined up. The graphics of the game don't really live up to the initial title screen, all characters look a bit too obviously like 8 by 8 UDGs rather than interesting personae. The game uses MODE 1 graphics but provides more than 4 colours by palette switching on interrupts. The synchronisation of this with frame flyback leaves a little to be desired as the points at which the colours switch are prone to move. All in all, a reasonable little game, but I don't know if I'll be rushing out to spend my hard earned pocket money on it.

AUTHOR	Amsoft
FORMAT	Cassette
PRICE	£8.95
GRAPHICS	***
PLAYABILITY	**
ADDICTIVENESS	**
OVERALL	***

THE SCOUT STEPS OUT



I don't think it would be fair to describe the Scout Steps Out as just another platforms and ladders game; certainly there are screens that are based on this format, but there is a whole lot more to it also. You play the part of a scout who must go on an adventure to pick up various items. Your day starts at the base camp where a whole troop of scouts is to be found. The first thing you must do is eat some cornflakes from the huge blue and white striped bowl (not unlike that used in a famous brand's adverts). Your number of lives increases for each cornflake that you eat up to a maximum of nine at any one time - though it is always possible to come back for more. Having done this, your trek may then begin. Passage between screens is achieved by approaching the arrows that indicate a passageway to the next screen or going into one of the tunnels. As you do this, the whole of the



next screen scrolls across into place - a very pleasing effect. Some screens have interesting sound effects; the wave noises on screens that contain bobbing waves are really brilliant and the tune that plays while at base camp is an infectious little ditty.

The appeal of the game is the originality of some of the screens, the mushrooms in the woods, the electronic circuit, the wet and wavy screens. Control of your character is pixel accurate and easy to control; unlike so many games where you have to be lined up exactly to change direction. The most remarkable thing about the whole game is the fact that it is written in BASIC, though I must point out that most of the interesting and speed conscious parts are implemented as Resident System Extensions. There isn't a screen in the game where full effect has not been made of multi-coloured graphics - your character really looks like a scout carrying a stick and rucksack, rather than some pathetic UDG, and the same is true of all the objects in the game. There are some screens in the game that are a little difficult at first, but the ability to replenish your cornflakes makes it reasonably easy to get the hang of them.

AUTHOR	Amsoft
FORMAT:	Cassette
PRICE	£8.95
GRAPHICS	*****
PLAYABILITY	****
ADDICTIVENESS	****
OVERALL	****

EXECUTIONER



Hello, what's this? A game with fast moving graphics requiring nerves of steel , not for the highly strung etc. Oh no, it's another Hangman. Yes folks, someone has taken the humble hangman and jazzed it up with the help of a marketing and graphics firm, and given it the old hard sell.

The only real difference is that you get vaporised at the end instead of being hung. If you get a letter wrong, a Star Wars type trooper marches on. When enough of them have gathered round, the star attraction (you) is shot at, gets an attack of the screaming abdabs and disappears in a cloud of XORed graphics. They got everything else right though, the cassette has slow speed on one side and high speed on the other, there is a choice of colour or monochrome monitor and the options are clear and menu driven. The only fault I found was that you are allowed to delete non-printable characters (like the [CLR] key). This mucked up their screen formatting a bit. Apart from the minor difference in the method of dispatch, this is your usual hangman with one thousand words in it's vocabulary and not much else to offer except little men walking on to the screen.

Rather an over-enthusiastic cassette cover, I thought. There were lots of bits that have very little to do with a hangman. The authors of the game were so short on features that they stuck their necks out and mentioned large characters as one, and that is getting desperate!

You can change the response times, word difficulty and (about the only novel feature) help levels for each player . This bit allows you to have one letter given as a clue and an additional crossword-type clue for a 10 point penalty.

Apart from this it is just a hangman, nicely executed, but just a hangman nevertheless with an enthusiastic cassette cover. If it is a hangman you are after, then this one is great, but if you are after gripping technicolour spritey stuff then I have no hang-ups about giving this game the chop.

AUTHOR	Datacom
FORMAT	Cassette
PRICE	£5.95
GRAPHICS	***
PLAYABILITY	**
ADDICTIVENESS	*
OVERALL	*

PSYCHEDELIA

This is a difficult review to write, not only because I cannot spell psychedelia (how's this?) but also because there is no real category to put it in, the author just calls it an entertainment. There are no winners or losers, you just do it.

To play this thing you twiddle the joystick whilst abusing the ears with whatever crazy, sinful and/or loud music turns you on. Listening through a Walkman is recommended so you don't hear your keyboard clicking or get interrupted from your leisure by the 'phone. Turn the brilliance on the monitor or telly way up and use one of those joysticks you wave around in the air if you have one. This is not a game for green screens.

A couple of problems here, due to the way computer keyboards work the poor machine get confused if you try to move about, fire and change colours all at the same time. It tends to think you have hit other keys and acts accordingly.

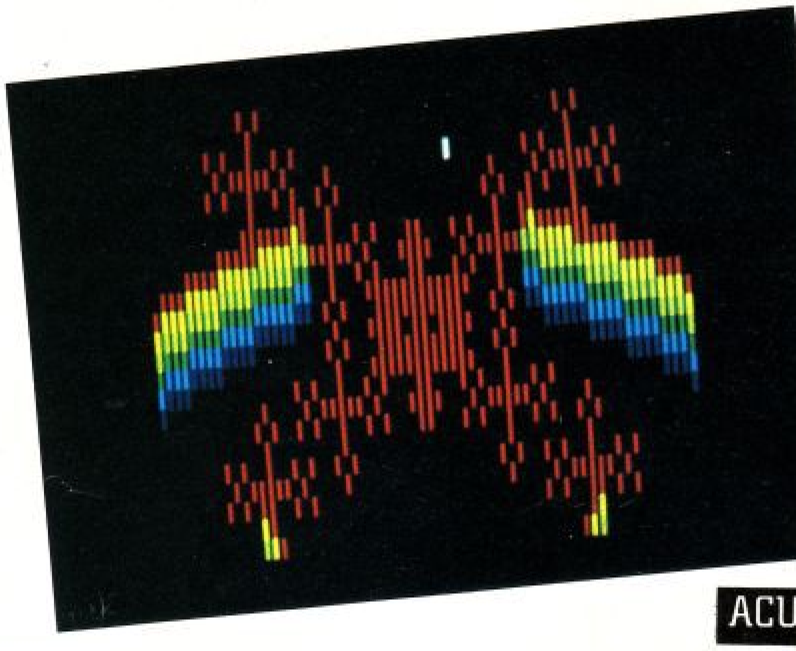
Also, when you change a parameter this blinding white message leaps into view at the bottom of the screen. I know it is nice to know what is going on but couldn't it have been done more subtly?

Pressing the fire button makes whatever kind of pattern you selected on the keyboard burst into life on the screen in glorious technicolour, pulsating and gyrating like a whirling dervish against your own background of twiddly bits. The basic shapes (which you can redefine yourself) grow and decay in several stages. Each one starts out as a white dot at the cursor and changes colour and size as it transforms in to a star, spiral, triangle, a traditional line or even a llama. These shapes change colour as they die off and are reflected to other parts of the screen by any symmetry you like.

You can create your own shapes, burst patterns, colour schemes, repeated movement sequences and all sorts of weird and wonderful stuff like that and quite a bit unlike it. It takes time to learn to fly this thing but it's fun learning.

There is a bit which records your movements for about half an hour, then you play it back and change all the colours and shapes as it goes. There is so much visual stuff in this program that can only really be shown. Find a friend with it and watch one of his taped shows. This will appeal to people who like the Laserium and other sorts of light shows. The rest of you will either love this one or loath it.

AUTHOR	Llamasoft
FORMAT	Cassette
PRICE	£6.00
GRAPHICS	****
PLAYABILITY	****
ADDICTIVENESS	****
OVERALL	****

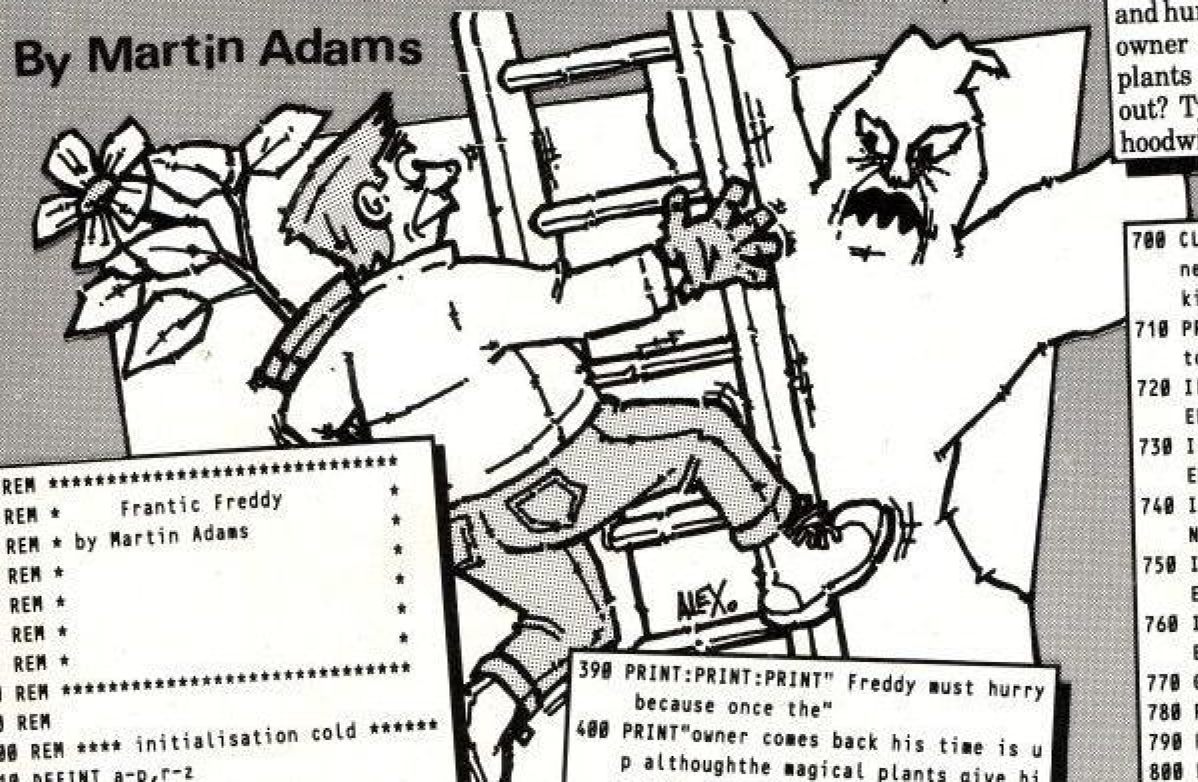


ACU

FRANTIC FREDDY

By Martin Adams

Poor old bob-a-job Freddy has to move some magical plants, guarded by ghosts, from the attic to the cellar of an old house. Freddy has five lives but he must still race against time and hurry up and move the plants before the owner of the house gets back. How many plants can you move before your time runs out? Type in this listing and help Freddy hoodwink the ghosts and move the plants.




```
10 REM *******************************
20 REM *      Frantic Freddy          *
30 REM * by Martin Adams              *
40 REM *                              *
50 REM *                              *
60 REM *                              *
70 REM *
80 REM ********************************
90 REM
100 REM **** initialisation cold ******
110 DEFINT a-p,r-z
120 MODE 1
130 LOCATE 13,12:PRINT"Frantic Freddy"
140 FOR i=1 TO 3000:NEXT i
150 DIM screen[20,25],midp[10],monc[10],
    mx[6],my[6],md[6]
160 DIM scoret[10],namet$[10],skillt[10]
170 upleftk=0:uprightk=2:leftk=8:rightk=
    1
180 upleftj=72:uprightj=73:leftj=74:righ
    tj=75
190 SYMBOL AFTER 248
200 SYMBOL 248,16,56,146,124,16,40,40,40
210 SYMBOL 249,16,56,16,254,16,40,68,130
220 REM
230 REM ********* TV type ************
240 CLS:PRINT"what type is your tv or mo
    nitor?"
250 LOCATE 4,4:PRINT"1) black and white"
260 LOCATE 4,6:PRINT"2) colour"
270 BORDER 0:INK 0,0:INK 1,24:INK 3,6:IN
    K 5,24:INK 6,26:INK 8,18:INK 9,11
280 IF NOT INKEY(64) OR NOT INKEY(13) TH
    EN INK 7,21:INK 10,26:INK 11,26:GOTO
     360
290 IF NOT INKEY(65) OR NOT INKEY(14) TH
    EN INK 7,6:INK 10,15:INK 11,18:GOTO
    360
300 GOTO 280
310 REM
320 REM ******** play again? ********
330 CLS:PRINT "would you like to play ag
    ain (y/n)?"
340 IF NOT INKEY(46) THEN CALL &BC02:BOR
    DER 1:PAPER 0:PEN 1:CALL &BB03:CLS:E
    ND
350 IF INKEY(43) THEN 340
360 REM ******* instructions ********
370 CLS:PRINT" Bob a job Freddy thinks h
    e has found aneasy job in moving som
    e pot plants from the attic to the c
    ellar of an old house."
380 PRINT:PRINT" But poor Freddy is in t
    rouble because  the plants are magic
    al and are gaurded  by angry ghosts.
    "
390 PRINT:PRINT:PRINT" Freddy must hurry
     because once the"
400 PRINT"owner comes back his time is u
    p althoughthe magical plants give hi
    m five lives."
410 LOCATE 1,25:PRINT"press space bar to
     continue"
420 IF INKEY(47) THEN 420
430 CLS
440 PRINT:PRINT " Move Freddy by using t
    he cursor keys orjoystick as shown b
    elow":PRINT
450 PRINT:PRINT TAB(3)+CHR$(247);" to ma
    ke Freddy go left."
460 PRINT:PRINT TAB(3)+CHR$(246);" to ma
    ke Freddy go right."
470 PRINT:PRINT TAB(3)+CHR$(244);" to ma
    ke Freddy jump to the left."
480 PRINT:PRINT TAB(3)+CHR$(245);" to ma
    ke Freddy jump to the right."
490 LOCATE 1,25:PRINT"press space bar to
     continue"
500 IF INKEY(47) THEN 500
510 CLS
520 PRINT SPACE$(5);CHR$(248)+CHR$(248)+
    CHR$(248)+CHR$(248)+CHR$(248);
530 PRINT SPACE$(5);" score 0 ";SPACE$(5
    )+CHR$(143)
540 LOCATE 8,3:PRINT CHR$(240)
550 FOR i=4 TO 7:LOCATE 8,i:PRINT ":":NE
    XT i
560 PRINT "Freddy's lives."
570 LOCATE 20,3:PRINT CHR$(240)
580 FOR i=4 TO 12:LOCATE 20,i:PRINT ":":
    NEXT i
590 LOCATE 13,13:PRINT"Freddy's score."
600 LOCATE 30,3:PRINT CHR$(240)
610 FOR i=4 TO 16:LOCATE 30,i:PRINT ":":
    NEXT i
620 LOCATE 28,17:PRINT"Alarm "
630 LOCATE 19,19:PRINT"green/light-owner
     out."
640 LOCATE 19,21:PRINT"red/dark-owner ne
    arby."
650 LOCATE 1,25:PRINT"press space bar to
     continue"
660 IF INKEY(47) THEN 660
670 REM
680 REM ******* skill level? *********
690 CALL &BB03
700 CLS:PRINT" The time taken for the ow
    ner to return is longer for higher s
    kill levels"
710 PRINT:PRINT" Choose skill level  1
    to 5  ";
720 IF NOT INKEY(64) OR NOT INKEY(13) TH
    EN skill=1:GOTO 780
730 IF NOT INKEY(65) OR NOT INKEY(14) TH
    EN skill=2:GOTO 780
740 IF NOT INKEY(57) OR NOT INKEY(5) THE
    N skill=3:GOTO 780
750 IF NOT INKEY(56) OR NOT INKEY(20) TH
    EN skill=4:GOTO 780
760 IF NOT INKEY(49) OR NOT INKEY(12) TH
    EN skill=5:GOTO 780
770 GOTO 720
780 PRINT skill
790 REM
800 REM **** initialisation warm *****
810 score=0:life=6
820 tlast=INT((RND*40)+30):tint=60*skill
    +tlast:tlast=tint-tlast
830 timeout=0
840 i=INT(RND*10):IF i>4 THEN side=1 ELS
    E side=-1
850 ilast=0:c=1
860 FOR i=1 TO 6:md[i]=1:NEXT i
870 GOSUB 2780:REM tune set up
880 REM
890 REM ****** screen set up ********
900 MODE 0:PEN 5
910 FOR i=1 TO 20:FOR j=1 TO 25:screen[i
    ,j]=0:NEXT j:NEXT i
920 FOR i=1 TO 20
930 LOCATE i,1:PRINT CHR$(207);:screen[i
    ,1]=14
940 LOCATE i,25:PRINT CHR$(207);:screen[
    i,25]=14
950 NEXT i
960 FOR i=2 TO 24
970 LOCATE 1,i:PRINT CHR$(207);:screen[1
    ,i]=14
980 LOCATE 20,i:PRINT CHR$(207);:screen[
    20,i]=14
990 NEXT i
1000 FOR j=5 TO 21 STEP 4
1010 side=side*-1
1020 FOR i=2 TO 19
1030 LOCATE i,j:PRINT CHR$(207)
1040 screen[i,j]=14
1050 NEXT i
1060 IF side=1 THEN i=INT(RND*6)+3 ELSE
     i=INT(RND*6)+11
1070 IF i=ilast THEN 1060 ELSE ilast=i:m
     idp(c)=i
1080 IF ilast>10 THEN monc[c]=3 ELSE mon
     c[c]=18
1090 LOCATE i,j:PRINT CHR$(32)
1100 screen[i,j]=0:screen[i,j-1]=2:scree
     n[i,j+3]=1
1110 c=c+1
1120 FOR lumps=1 TO 4
1130 lumpx=INT(RND*16)+3:IF lumpx=i OR s
     creen[lumpx,j+1]=14 OR screen[lumpx
```

```
+1,j+1]=14 OR screen[lumpx-1,j+1]=14 THEN 1130
1140 LOCATE lumpx,j+1:PRINT CHR$(207):screen[lumpx,j+1]=14
1150 NEXT lumps
1160 NEXT j
1170 PEN 8
1180 IF monc[1]=18 THEN temp=19 ELSE temp=2
1190 LOCATE temp,5:PRINT CHR$(35);:screen[temp,4]=4
1200 PEN 9
1210 IF monc[5]=18 THEN temp=19 ELSE temp=2
1220 LOCATE temp,25:PRINT CHR$(35);:screen[temp,24]=5
1230 PEN 10
1240 IF monc[1]=18 THEN LOCATE 19,4 ELSE LOCATE 2,4
1250 PRINT CHR$(229)
1260 PEN 6
1270 LOCATE 3,1:PRINT CHR$(248);CHR$(248);CHR$(248);CHR$(248);CHR$(32)
1280 LOCATE 8,1:PRINT"score";SPACE$(6);:LOCATE 13,1:PRINT score
1290 REM
1300 REM ****** place players *******
1310 snda=1
1320 IF sndsync=0 THEN 1320
1330 life=life-1:obj=0:fall=0:coll=0:caught=0:qdatum=TIME:ctime=0
1340 IF timeout=1 THEN timeout=0:LOCATE x,y:PRINT CHR$(32);
1350 PEN 11:LOCATE 17,1:PRINT CHR$(143)
1360 PEN 10
1370 IF monc[1]=18 THEN LOCATE 19,4 ELSE LOCATE 2,4
1380 PRINT CHR$(229)
1390 PEN 6
1400 LOCATE 3,1:PRINT SPACE$(5)
1410 LOCATE 3,1:FOR i=life-1 TO 1 STEP -1:PRINT CHR$(248);:NEXT i
1420 IF life=0 THEN CALL &BCA7:snda=0:sndb=0:GOSUB 2380:PEN 1:GOTO 320
1430 IF monc[5]=18 THEN x=19 ELSE x=2
1440 y=24:LOCATE x,y:PRINT CHR$(248)
1450 PEN 7
1460 st=0
1470 FOR m=1 TO 5
1480 st=st+4
1490 my[m]=st:mx[m]=monc[m]:LOCATE mx[m],my[m]:PRINT CHR$(224)
1500 NEXT m
1510 mx[6]=10:my[6]=24
1520 PEN 6
1530 REM
1540 REM ********* main loop ********
1550 GOSUB 1820:REM move Freddy
1560 IF coll THEN 1750:REM collision
1570 GOSUB 1930:REM Freddy fall
1580 PEN 7:REM move ghosts
1590 FOR m=1 TO 6
1600 xm=mx[m]:ym=m*4
1610 GOSUB 2340:IF caught THEN 1750
1620 IF screen[xm+md(m),ym]<2 THEN LOCATE xm,ym:PRINT CHR$(32);:mx[m]=xm+md[m]:xm=mx[m]:LOCATE xm,ym:PRINT CHR$(224); ELSE md[m]=md[m]*-1
1630 GOSUB 2340:IF caught THEN 1750
1640 NEXT m:REM ghost move ends
1650 PEN 6
1660 IF screen[x,y]=4 THEN obj=1
1670 IF obj THEN IF screen[x,y]=5 THEN obj=0:score=score+10/skill:LOCATE 13,1:PRINT SPACE$(3);:LOCATE 13,1:PRINT score:PEN 10:IF monc[1]=18 THEN LOCATE 19,4:PRINT CHR$(229) ELSE LOCATE 2,4:PRINT CHR$(229):PEN 6
1680 ctime=(TIME-qdatum)/300:IF ctime>tlast THEN PEN 3:LOCATE 17,1:PRINT CHR$(143):PEN 6
1690 IF ctime<tint THEN 1550
1700 REM
1710 REM ********* Freddy gone ********
1720 timeout=1
1730 SOUND 4,100,50,15:SOUND 4,200,50,15:SOUND 4,300,50,15
1740 FOR i=1 TO 200:NEXT i
1750 GOSUB 2780
1760 FOR m=1 TO 6
1770 LOCATE mx[m],my[m]:PRINT CHR$(32)
1780 NEXT m
1790 snda=0:sndb=0:CALL &BCA7:sndsync=0
1800 GOTO 1300:REM start again
1810 REM
1820 REM ******** Freddy MOVE ********
1830 IF fall THEN RETURN ELSE h1=x:h2=y
1840 IF NOT INKEY(upleftj) OR NOT INKEY(upleftk) THEN IF screen[x,y-1]<14 THEN jumpr=-1:GOTO 1890
1850 IF NOT INKEY(uprightj) OR NOT INKEY(uprightk) THEN IF screen[x,y-1]<14 THEN jumpr=1:GOTO 1890
1860 IF NOT INKEY(leftj) OR NOT INKEY(leftk) THEN IF screen[x-1,y]<14 THEN x=x-1:fr=248:GOTO 1900
1870 IF NOT INKEY(rightj) OR NOT INKEY(rightk) THEN IF screen[x+1,y]<14 THEN x=x+1:fr=248:GOTO 1900
1880 RETURN
1890 fr=248:GOSUB 2000
1900 IF coll=0 THEN LOCATE h1,h2:PRINT CHR$(32);:LOCATE x,y:PRINT CHR$(fr);
1910 RETURN
1920 REM
1930 REM ******* Freddy fall *********
1940 IF screen[x,y+1]=14 THEN RETURN
1950 LOCATE x,y:PRINT CHR$(32);
1960 y=y+1:LOCATE x,y:PRINT CHR$(249);
1970 IF screen[x,y+1]=14 THEN fall=0 ELSE fall=1
1980 RETURN
1990 REM
2000 REM ******* Freddy jump *********
2010 SOUND 4,100,20,15
2020 IF screen[x,y]<>1 THEN 2090
2030 LOCATE x,y:PRINT CHR$(32);
2040 FOR i=1 TO 4
2050 y=y-1:LOCATE x,y:PRINT CHR$(249);:LOCATE x,y:PRINT CHR$(32);
2060 NEXT i
2070 x=x+jumpr
2080 LOCATE x,y:PRINT CHR$(249);:RETURN
2090 LOCATE x,y:PRINT CHR$(32);
2100 x=x+jumpr:y=y-1:GOSUB 2230:IF coll THEN RETURN
2110 LOCATE x,y:PRINT CHR$(249);
2120 LOCATE x,y:PRINT CHR$(32);
2130 x=x+jumpr:y=y-1:GOSUB 2230:IF coll THEN RETURN
2140 LOCATE x,y:PRINT CHR$(249);
2150 LOCATE x,y:PRINT CHR$(32);
2160 x=x+jumpr:y=y+1:GOSUB 2230:IF coll THEN RETURN
2170 LOCATE x,y:PRINT CHR$(249);
2180 LOCATE x,y:PRINT CHR$(32);
2190 x=x+jumpr:y=y+1:GOSUB 2230:IF coll THEN RETURN
2200 LOCATE x,y:PRINT CHR$(249);
2210 RETURN
2220 REM
2230 REM *** Freddy collision check ***
2240 IF screen[x,y]<14 THEN coll=0:RETURN
2250 SOUND 4,0,30,15,0,0,15
2260 FOR i=1 TO 3
2270 LOCATE x,y:PRINT CHR$(203)
2280 FOR j=1 TO 100:NEXT j
2290 LOCATE x,y:PRINT CHR$(207)
2300 NEXT i
2310 coll=1
2320 RETURN
2330 REM
2340 REM **** Freddy caught check ****
2350 IF xm=x THEN IF ym=y THEN SOUND 4,100,15,15,0,1:LOCATE xm,ym:PRINT CHR$(32);:FOR i=1 TO 100:NEXT i:LOCATE xm,ym:PRINT CHR$(224);:caught=1
2360 RETURN
2370 REM
2380 REM ***** display scores ********
2390 MODE 1:PEN 5:CALL &BB03
2400 INPUT "what is your name ";name$
2410 name$=LEFT$(name$,9)
2420 CLS
2430 FOR i=10 TO 1 STEP -1
2440 IF scoret[i] > score THEN NEXT i:GOTO 2500
2450 FOR j=i TO 1 STEP -1
2460 tempscore=scoret[j]:tempname$=namet$[j]:tempskill=skillt[j]
2470 scoret[j]=score:namet$[j]=name$:skillt[j]=skill
2480 score=tempscore:name$=tempname$:skill=tempskill
2490 NEXT j
2500 PRINT" name"SPACE$(7);"score";SPACE$(8);"skill":PRINT
2510 FOR i=10 TO 1 STEP -1
2520 PRINT CHR$(32);namet$[i],scoret[i],skillt[i]
2530 NEXT i
2540 LOCATE 1,25:PRINT"press space bar to continue"
2550 IF INKEY(47) THEN 2550
2560 RETURN
2570 REM
2580 REM ****** tune part A **********
2590 IF snda=1 THEN sndb=1:sndsync=1 ELSE sndb=0:RETURN
2600 SOUND 1,300,20,vol
2610 SOUND 1,1000,25,0
2620 SOUND 1,400,20,vol
2630 SOUND 1,1000,20,0
2640 SOUND 1,300,20,vol
2650 RETURN
2660 REM
2670 REM ******* tune part B *********
2680 IF sndb=0 THEN RETURN
2690 SOUND 1,300,20,vol
2700 SOUND 1,1000,17,0
2710 SOUND 1,350,20,vol
2720 SOUND 1,1000,25,0
2730 SOUND 1,400,20,vol
2740 SOUND 2,1000,120,0
2750 SOUND 2,450,20,vol
2760 RETURN
2770 REM
2780 REM ********* tune set up ********
2790 ENT 1,150,-12,1
2800 delay1=350
2810 EVERY delay1 GOSUB 2580
2820 FOR i=1 TO 2500:NEXT i
2830 EVERY delay1,1 GOSUB 2580
2840 FOR i=1 TO 2500:NEXT i
2850 EVERY delay1,2 GOSUB 2670
2860 FOR i=1 TO 3000:NEXT i
2870 EVERY delay1,3 GOSUB 2670
2880 snda=1:vol=13
2890 RETURN
```

ACU

SHINECREST

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The latest addition to the Shinecrest range has been enthusiastically received by both dealers and home computer owners for providing all the facilities a computer user could require. Shown in our photograph with the Amstrad CPC464 you can see there remains plenty of space both behind and alongside the computer. The raised shelf provides ample room for your monitor, and if you choose, a printer. Any weight will be easily supported as all the shelves are fitted to two metal rails which travel the full width of the desk and locate into the metal ends. Castors provide an often needed mobility for your desk. The shelves are supplied in a Teak woodgrain finish to compliment the dark metalic brown painted metal rails and end frames.

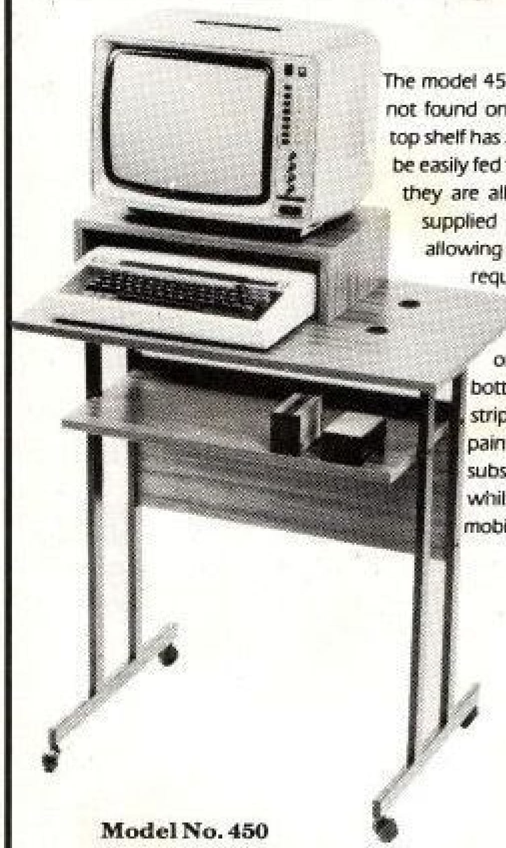
At the back of the desk there is ample space above and below the courtesy panel for interconnecting leads and paper feed to the printer. Every requirement has been provided for.

Dimensions		
	Distance between top and middle shelf	146 mm (5 3/4")
	Distance between middle and bottom shelf	216 mm (8 1/2")
	Depth of plinth	292 mm (11 1/2")
	Depth of bottom shelf	320 mm (12 1/2")
	Width	983 mm (36 3/4")
	Depth	610 mm (24")
	Height	889 mm (35")

PRICE £69-95



Model No. 600



The model 450 workstation has many features not found on large desks twice the cost. The top shelf has 3 large holes to allow the leads to be easily fed to the back of the unit. Once here they are all fed into a 4 into 1 masterplug supplied with the workstation, thus allowing just one lead (supplied) to be required for mains electricity. The pre formed plinth is moveable allowing it to be used either left or right "handed". Fitted to the bottom edges is a non slip rubber strip making your monitor safe. The painted metal frame provides substantial strength and stability whilst the fitted castors allow easy mobility.

Model No. 450



Model No. 500

An attractive piece of computer furniture the model 500 also provides all the computers users requirements. A full width monitor shelf allows easy left or right handed operation whilst still providing space for the printer. The large work surface gives plenty of room for your Amstrad computer with ample "working room" still available. A unique Shinecrest development allows the desk to be mobile by the fixing of 2 painted metal castor supports. The very large courtesy panel ensures that the desk is stable and solid and will not "rock" like some models available. The back is "cut away" to allow unobtrusive removal of leads. The model 500 is available in a Teak woodgrain finish.

Dimensions		
	Depth of plinth	296 mm (11 1/2")
	Width of plinth	478 mm (18 3/4")
	Distance between lower shelf and working shelf	178 mm (7")
	Width	762 mm (30")
	Depth	500 mm (19 3/4")
	Height	743 mm (29 1/4")

PRICE £59-95

Dimensions		
	Depth of plinth	296 mm (11 1/2")
	Distance between top and middle shelf	130 mm (5")
	Width	965 mm (38")
	Depth	590 mm (23 1/4")
	Height	865 mm (34")

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Knight Lore From the Inside

Words by Cliff Lawson
Illustrations by Jill Turner

I thought the 464 version of Jet Set Willy was probably the best game for the machine to be produced so far (I have to admit to being a Manic fan), that was until I got one of the first pre-production copies of Knight Lore. The first thing I do when I receive a new game is to get out my header reader/protection breaker program - an essential program for any would-be train spotter. There are plenty of this type of program advertised in any number of computer magazines, (Not this one -Ed.), unfortunately we can't really tell you how to do this sort of thing in an Amsoft related magazine, though I'm sure any one who understands the Firmware manual wouldn't find it too daunting a task to write one.

Unlike versions of the program on other machines, Ultimate haven't gone out of their way to use turbo-loaders or fancy protection schemes. So, getting the all important POKEs in shouldn't be too difficult a task, even for any virgin train spotters. Luckily, I also came by a copy of Alien 8 and, suprise, suprise, the method of loading is virtually identical. Consequently, we are providing two listings, the first will install various POKEs for Knight Lore, the other for Alien 8. I'll descibe how the first is used and hopefully the second should then be obvious.

First, type in listing 1 and save it on a blank tape. Now, reset the machine, rewind the tape and type

```
LOAD "
```

Take the new tape out of the datacorder and replace it with the Knight Lore tape rewound to the start. Push down the PLAY key then type

```
RUN
```

The first four blocks should load, at which point you will be met by the usual loading screen - however, the question 'NUMBER OF OBJECTS' will appear at the bottom of the screen - this question refers to the number of objects that must be taken to the central cauldron in order to finish the game, usually, the value is 14, but I'm sure you want to finish the game, so type 1 followed by Enter. You are now asked 'INFINITE LIVES ?', I think the answer is obvious, type 'y' followed by Enter (upper or lower case). Hitting just Enter will give the answer 'n', for no. You are now asked 'INFINITE TIME ?', if you answer 'y' to this, then the sun will never rise and you will never change into a werewolf - this is probably the best idea. Alternatively, answering 'n' or just Enter will produce the question 'NUMBER OF DAYS', this is the length of time that you have to complete the adventure.

The questions in the Alien 8 program are similar, except that 'NUMBER OF CHAMBERS' refers to the number of chambers that must be activated to finish the game - this would usually be 24, a value of 1 will allow you to finish the game quite quickly.

In both programs, the infinite lives POKE is very similar, in both the code consists of a :

```
LD HL,#00XX
DEC (HL)
```

So POKEing the DEC (HL) to zero (a No OPeration) prevents the program from ever reducing the number of lives left.

The days in Knight Lore and the years in Alien 8 are both held in Binary Coded Decimal, so finding the poke to disable them was not too difficult --simply look through the code for Decimal Adjust Accumulator (DAA) operations.

The number of objects or chambers to finish the two games were reasonably easy to find once I knew how many objects were needed to finish normally (14 in Knight Lore). You are told that 24 chambers must be reactivated in Alien 8. It was a simple matter of looking through for

```
CP 14
```

instructions in Knight Lore (there is only one, so I knew that must be it). I couldn't find a:

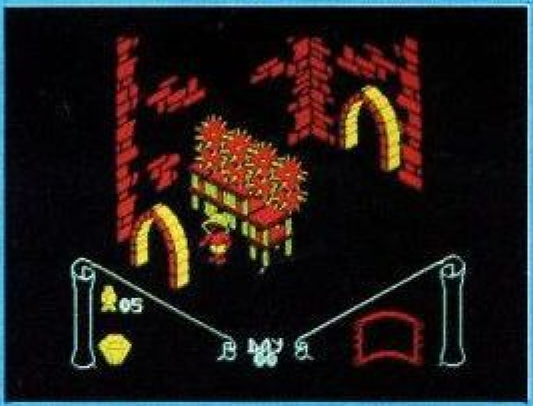
```
CP 24
```

instruction in Alien 8 until I realised that, because the number is displayed on the screen, it would almost certainly be held in BCD -- low and behold, I soon found a

```
CP #24
```

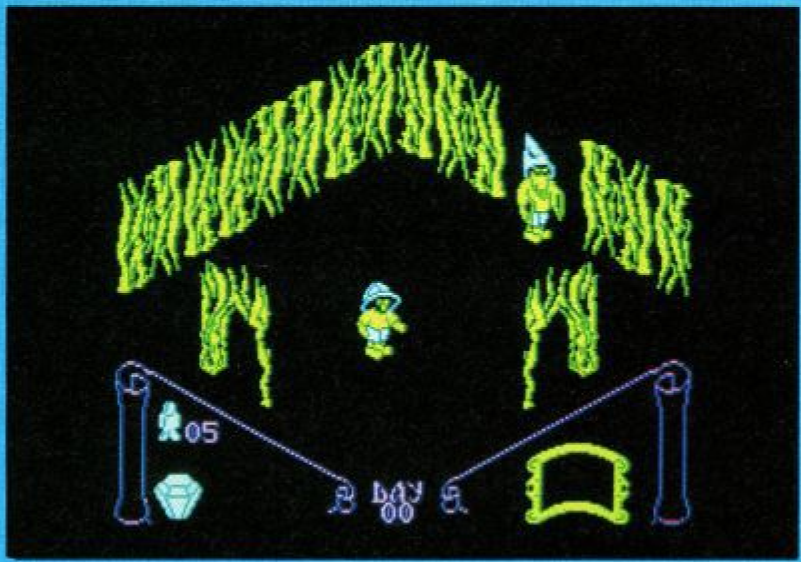
instruction after a DAA.

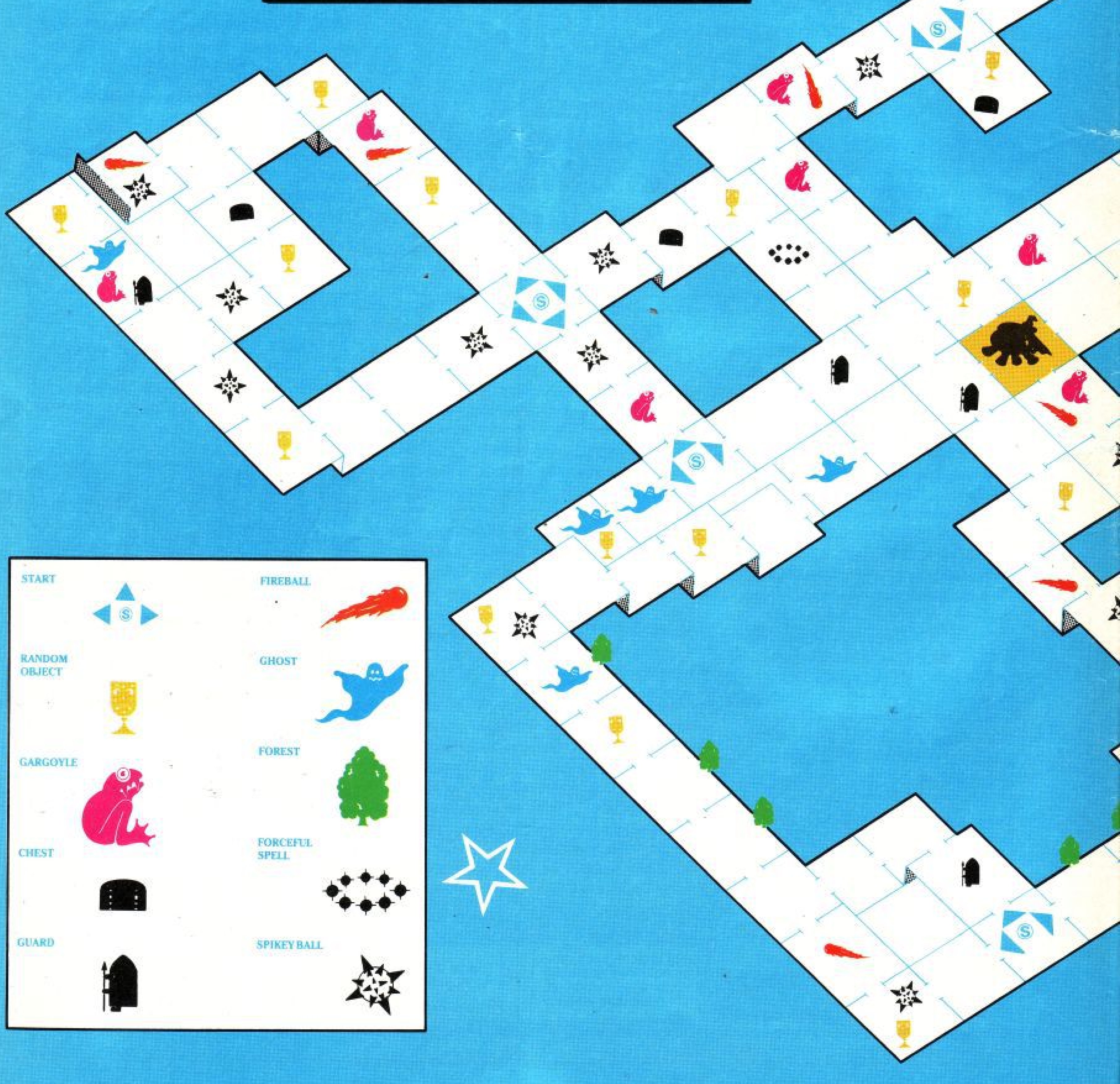
The above shows how, with a rudimentary knowledge of Z80 assembler and a header reading program to find where a binary block will load, anyone can dabble in the mysterious world of train spotting.

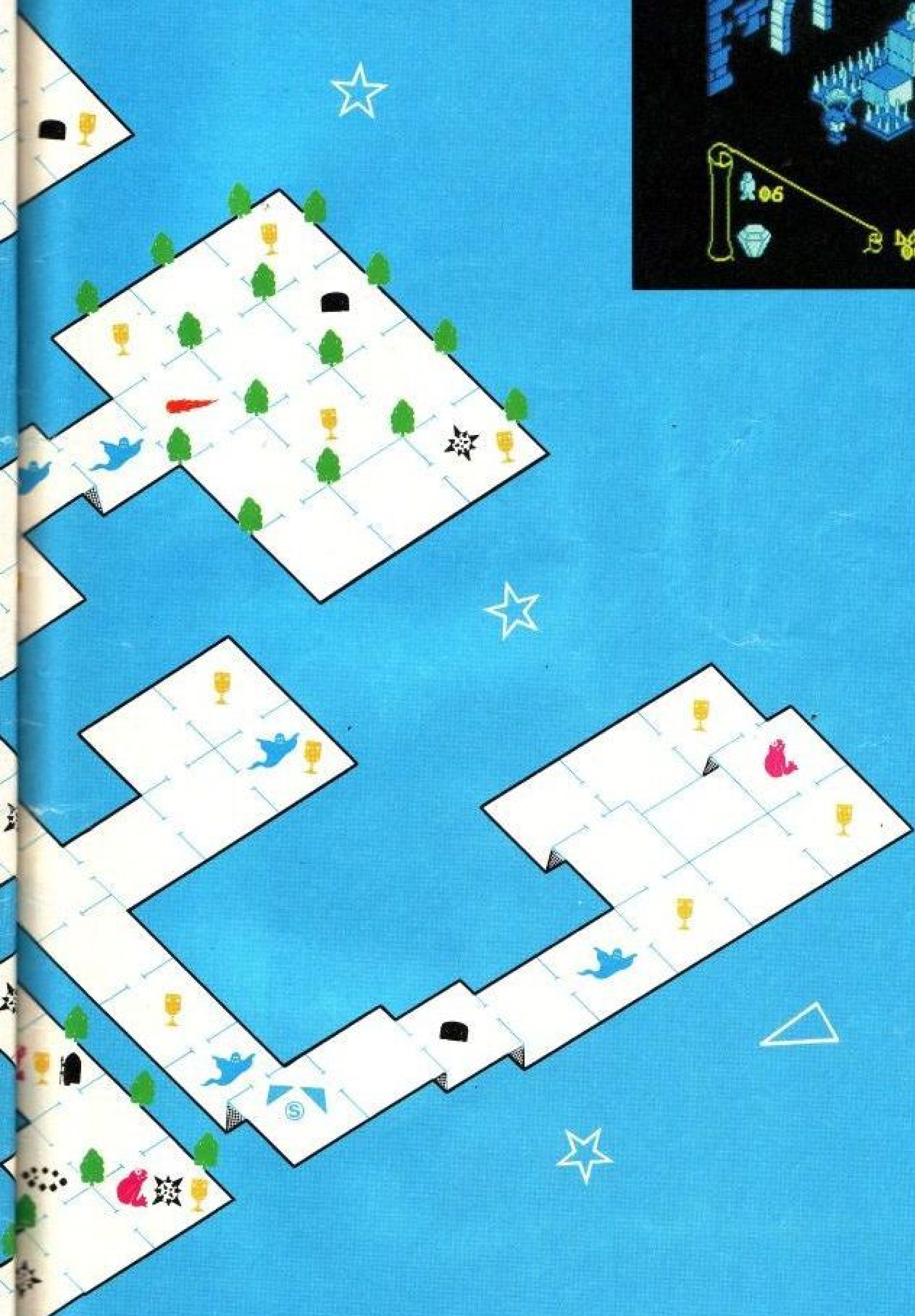


By the way, if you are wondering why I refer to people who look at others code as train spotters and not hackers, there are two reasons, a) it is a term used by some of the greatest exponents of the art who write for a magazine that supports a different computer and b) the term hacker is a rather misused word that is also used to describe people who access computer databases.

At this point I would have liked to be able to tell you the load addresses and lengths of the blocks used in each of the programs to enable you too easily copy them to disc (yes they both work on disc, they even work on 1.1 machines!). However, I might as well stand on the street corner giving away freebie copies


05


START
FIREBALL
RANDOM OBJECT
GHOST
GARGOYLE
FOREST
CHEST
FORCEFUL SPELL
GUARD
SPIKEY BALL



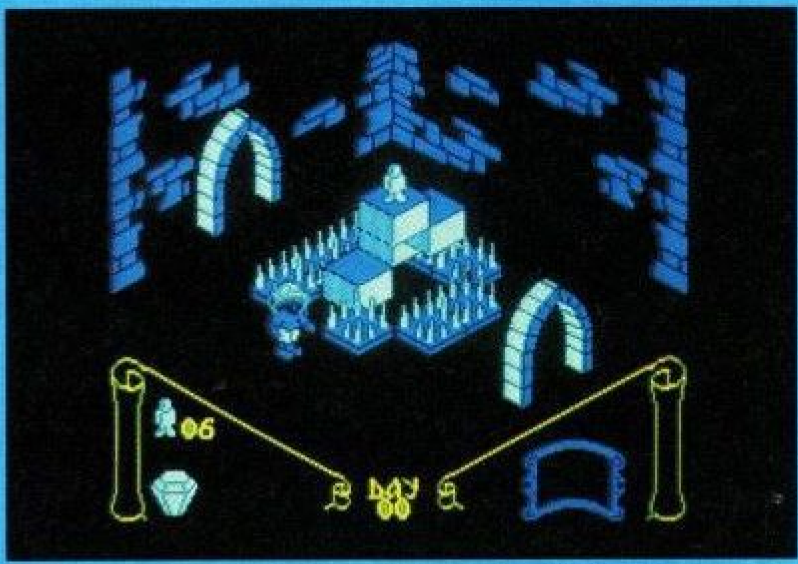
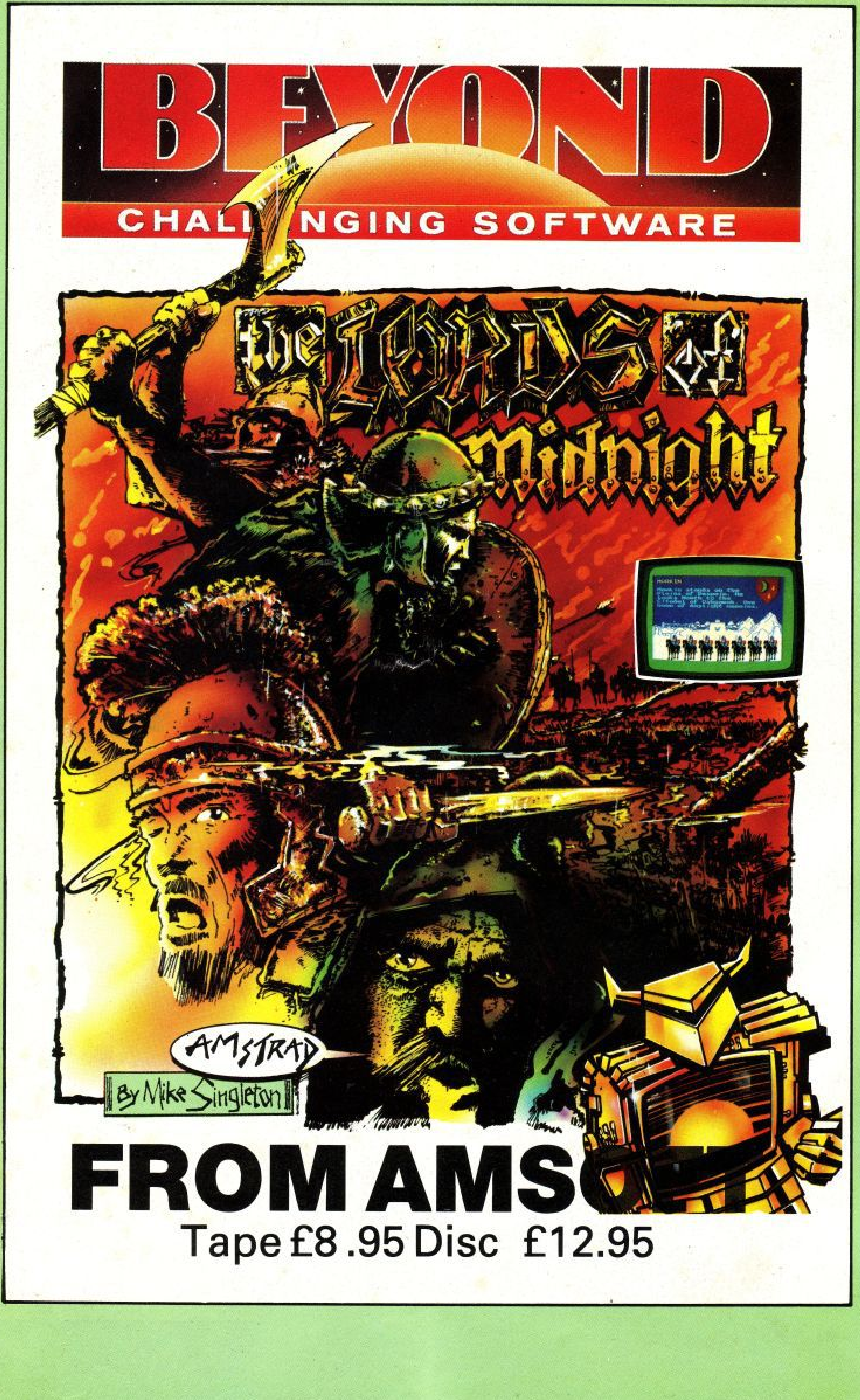


TABLE SHOWING OBJECTS AND THEIR CODES

CODE	DESCRIPTION
00	solid block
10	bouncing ball
20	gargoyle
30	treasure chest
40	NS knight
50	EW fireball
60	bouncing ball
70	NS block
80	mobile block
90	falling spikes
A0	NS fireball
B0	exploding block
C0	bouncing ball
D0	NS potcullis
E0	bouncing ball
F0	NEVER USE
08	static fireball
18	jungle block
28	impaler
38	table
48	ghost
58	high block
68	EW knight
78	EW block
88	high impaler
98	high spikes
A8	sinking block
B8	mobile ball
C8	sparkling spell
D8	EW portcullis
E8	NEVER USE
F8	NEVER USE


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as do this - so I'm afraid I am not going to tell you.

Anyway, back to the programs, the following applies solely to Knight Lore but the information gleaned here may also be used while looking at Alien 8. I speak of course about the next step up the ladder, desiging your own rooms in the game.

A byte containing &FF marks the end of the colour/shape data for one room and the start of the object info. for that room. Looking at the accompanying map, the first room is the one in the upper left corner, the second is the one below this and so on down to the bottom middle corner, the next is the one to the right of the first and so on downwards and across.

i.e.

```
00 10 20 ...
 01 11 21
  02 12 22
   .
    .
```

The first byte defines the type and number of a particular type of block, the bottom 3 bits indicate how many (1 - 8 mapped from 0 - 7) while the top bits indicate the type. Zero means a solid block, &18 means a jungle type block, &38 means a table ... (others are shown in the table below). Thus a byte &03 means 4 solid blocks and &38 means a single jungle block. This byte is then followed by a corresponding number of bytes that indicate where in the room the blocks should be placed. The maximum room size is 8 by 8 and the positions are numbered:

```
00 08 10 . . . . . 30 38
 01 09 11           31 39
  02 0A .            32 3A
   03 0B .            33 3B
    04 0C 14           34 3C
     05 0D .            35 3D
      06 0E .            36 3E
       07 0F . . . . . . .37 3F
```

There are a four levels, 00 - 3F are the ground floor, 40 - 7F are the first floor, 80 -BF are the second floor and C0 - FF are the third floor. So the following bytes:
03 14 54 94 D4
indicate a four high pillar on square 14 above.

note:

1) NS means in the direction from top left to bottom right of screen.
2) EW means in the direction from bottom left to top right of screen.
3) NEVER USE inplies an undefined object that will crash the program.
4) 'bouncing ball' appears several times, these have different rise and fall rates.
5) large objects (tables, chests, portculli, etc) actually occupy the best part of two squares.
6) those objects described as 'high' appear 3 levels above the level on which they are defined to appear.
7) 'high spikes' do not fall until an object is picked up in the room where they appear unless there is some object beneath them.

The information that proceeds the room contents consists of room number which is followed by a byte that gives an offset to the next room number - in this way, the whole of the room data is held as a linked list. This is followed by a byte that indicates the colour of the room and the logical position of the walls (i.e. in a room that is only four blocks wide, sabreman must be prevented from going into the first or last two columns on the floor plan - this byte indicates where he may go).A variable number of bytes follow this, these predominantly describe the shape and position of the doors - but may also indicate the blocks that are beneath doors that are in the air or the existence of a cauldron or wizard in room.The byte before the &FF indicates the shape of the room (8*8, 6*8 or 8*6). andalso whether it is walled or jungle.

Because it would be very difficult to shuffle all the data about, and keep the links intact, I'm afraid we are probably constrained to the number of objects that already exist in any particular room. As an example, room number 0, in the top left corner contains a number of blocks and is therefore a good candidate for re-designing. The data for this room is held at &53E3, so, by adding the lines below to the Knight Lore loader program, the block data for this room will be replaced and hence the room will be completely redesigned. The new design hopefully spells out a two letter word, though the use of all those different types of object does tend to make it slightly less readable than if it had all been done in solid blocks, but that wouldn't have been half as interesting would it?

1 « Listing 1

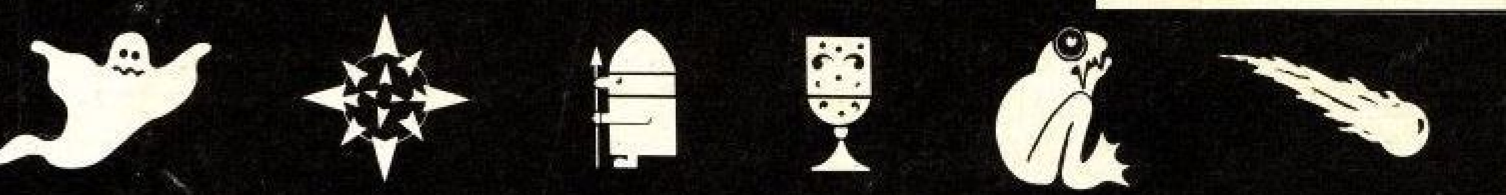
```
10 OPENOUT "d
20 MEMORY &10FF
30 LOAD "!",&1100
40 FOR i=1 TO 7
50  READ addr$,byte$
60  POKE VAL("&"+addr$),VAL("&"+byte$)
70 NEXT i
80 DATA 1101,0,1102,0,1103,0,1132,c9,114
   8,31,1149,ff,114a,bf
90 CALL &1100
100 LOCATE 12,25:INPUT"NUMBER OF OBJECTS
    ",no
110 LOCATE 12,25:PRINT SPC(25):LOCATE 12
    ,25:INPUT"INFINITE LIVES ? ",cj$
120 cj$=LEFT$(LOWER$(cj$+"n"),1)
130 LOCATE 12,25:PRINT SPC(25):LOCATE 12
    ,25:INPUT"INFINITE  TIME ? ",dg$
140 dg$=LEFT$(LOWER$(dg$+"n"),1)
150 LOCATE 12,25:PRINT SPC(25)
160 IF dg$<>"y" THEN LOCATE 12,25:INPUT"
    NUMBER OF DAYS : ",nd:fred=1:IF nd>9
    9 THEN GOTO 160
170 nd=VAL("&"+STR$(nd))
180 LOAD"!",&2000
190 POKE &3AFF,no
200 IF cj$="y" THEN POKE &49C9,0
210 IF dg$="y" THEN POKE &3C4E,0:POKE &3
    C4F,0:POKE &3C50,0 ELSE IF fred THEN
     POKE &3CCF,nd
220 CALL &1148
```

1 « Listing 2

```
10 OPENOUT "d
20 MEMORY &10FF
30 LOAD "!",&1100
40 FOR i=1 TO 7
50  READ addr$,byte$
60  POKE VAL("&"+addr$),VAL("&"+byte$)
70 NEXT i
80 DATA 1101,0,1102,0,1103,0,1128,c9,113
   e,31,113f,ff,1140,bf
90 CALL &1100
100 LOCATE 12,25:INPUT"INFINITE LIVES ?
    ",cj$
110 cj$=LEFT$(LOWER$(cj$+"n"),1)
120 LOCATE 12,25:PRINT SPC(25):LOCATE 12
    ,25:INPUT "INFINITE TIME ? ",ti$
130 ti$=LEFT$(LOWER$(ti$+"n"),1)
140 LOCATE 12,25:PRINT SPC(25):LOCATE 12
    ,25:INPUT "NUMBER OF CHAMBERS ",nc
150 nc=VAL("&"+STR$(nc))
160 LOAD "!",&2000
170 IF cj$="y" THEN POKE &418E,0
180 IF nc<>0 THEN POKE &315E,nc
190 IF ti$="y" THEN POKE &2EFE,0
200 CALL &113E
```

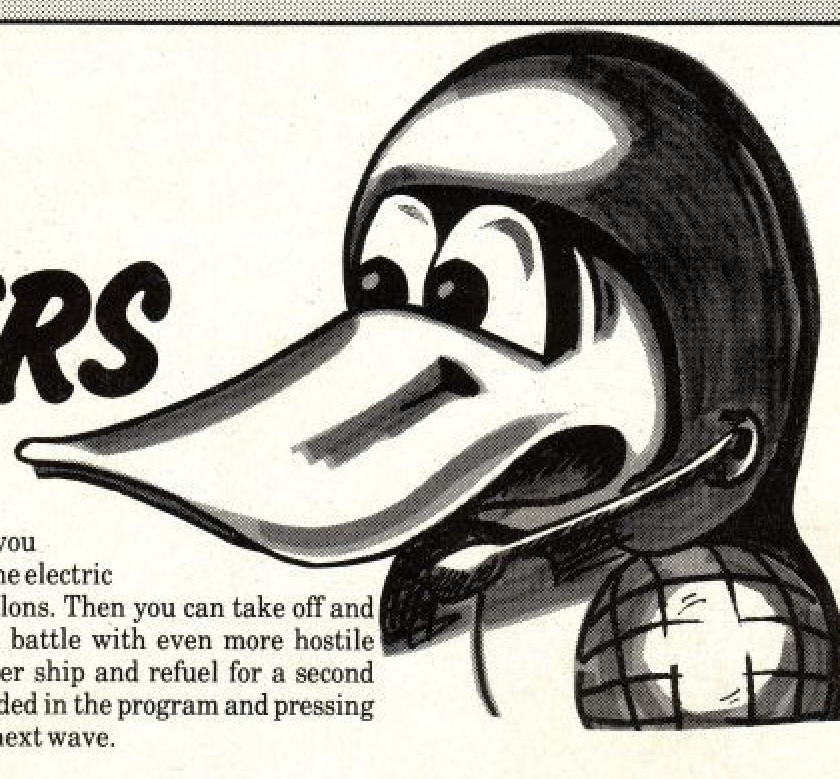
1 « Listing 3

```
211 FOR i=1 TO 19:READ f:POKE &53E3+i,f:
    NEXT i
212 DATA &b7,&ca,&da,&8b,&9b,&4c,&54,&5c
    ,&93
213 DATA &7a,&d,&1d,&2d
214 DATA &18,&6c
215 DATA &a8,&ab
216 DATA &20,&ea
217 POKE &56ED,1:POKE &56EE,4:POKE &56EF
    ,5:POKE &56F0,6:POKE &56F1,&F:POKE &
    56F2,&10
```



ACU

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You pilot a little space craft, rapidly moving over the surface of the planet shooting down enemy ships. Once the mission is complete you have to fly through a field dodging the electric fences flying though gaps in the pylons. Then you can take off and fly into deep space where you can battle with even more hostile aliens before you reach your mother ship and refuel for a second attempt. Full instructions are included in the program and pressing Tab at any time, takes you onto the next wave.

listing 1

```
10 'CALL &8000
20 'KEY DEF 18,1,32:KEY DEF 6,1,32
30 SPEED INK 10,10
40 PAPER 0:SYMBOL AFTER 32
50 CLS:MODE 0:BORDER 0:INK 14,2,18:INK 1
   5,18,2
60 FOR A=0 TO 10:READ B:INK A,B:NEXT
70 DATA 0,3,6,15,24,18,19,11,2,8,4
80 LOCATE 5,2
90 PEN 3:PRINT CHR$(158);CHR$(154);
100 PEN 4:PRINT CHR$(156);CHR$(148);
110 PEN 5:PRINT CHR$(32);CHR$(148);
120 PEN 6:PRINT CHR$(150);CHR$(154);
130 PEN 7:PRINT CHR$(156);CHR$(148);
140 PEN 8:PRINT CHR$(32);CHR$(148);
150 LOCATE 5,3
160 PEN 3:PRINT CHR$(149);CHR$(32);
170 PEN 4:PRINT CHR$(149);CHR$(149);
180 PEN 5:PRINT CHR$(32);CHR$(149);
190 PEN 6:PRINT CHR$(149);CHR$(32);
200 PEN 7:PRINT CHR$(32);CHR$(149);
210 PEN 8:PRINT CHR$(194);CHR$(192);
220 LOCATE 5,4
230 PEN 3:PRINT CHR$(149);CHR$(32);
240 PEN 4:PRINT CHR$(149);CHR$(149);
250 PEN 5:PRINT CHR$(32);CHR$(149);
260 PEN 6:PRINT CHR$(149);CHR$(32);
270 PEN 7:PRINT CHR$(32);CHR$(151);
280 PEN 8:PRINT CHR$(199);CHR$(32);
290 LOCATE 5,5
300 PEN 3:PRINT CHR$(149);CHR$(32);
310 PEN 4:PRINT CHR$(149);CHR$(149);
320 PEN 5:PRINT CHR$(32);CHR$(149);
330 PEN 6:PRINT CHR$(149);CHR$(32);
340 PEN 7:PRINT CHR$(32);CHR$(149);
350 PEN 8:PRINT CHR$(193);CHR$(195);
360 LOCATE 5,6
370 PEN 3:PRINT CHR$(155);CHR$(154);
380 PEN 4:PRINT CHR$(153);CHR$(147);
390 PEN 5:PRINT CHR$(154);CHR$(153);
400 PEN 6:PRINT CHR$(147);CHR$(154);
410 PEN 7:PRINT CHR$(153);CHR$(145);
420 PEN 8:PRINT CHR$(32);CHR$(145);
430 LOCATE 1,8
440 PEN 1:PRINT CHR$(158);CHR$(154);
450 PEN 2:PRINT CHR$(156);CHR$(150);
460 PEN 3:PRINT CHR$(154);CHR$(156);
470 PEN 4:PRINT CHR$(158);CHR$(154);
480 PEN 5:PRINT CHR$(156);CHR$(150);
490 PEN 6:PRINT CHR$(154);CHR$(156);
500 PEN 7:PRINT CHR$(150);CHR$(154);
510 PEN 8:PRINT CHR$(150);CHR$(154);
520 PEN 9:PRINT CHR$(156);CHR$(150);
530 PEN 10:PRINT CHR$(154);CHR$(156);
540 LOCATE 1,9
550 PEN 1:PRINT CHR$(149);CHR$(32);
560 PEN 2:PRINT CHR$(149);CHR$(149);
570 PEN 3:PRINT CHR$(32);CHR$(149);
580 PEN 4:PRINT CHR$(149);CHR$(32);
590 PEN 5:PRINT CHR$(149);CHR$(149);
600 PEN 6:PRINT CHR$(32);CHR$(32);
610 PEN 7:PRINT CHR$(149);CHR$(32);
620 PEN 8:PRINT CHR$(149);CHR$(32);
630 PEN 9:PRINT CHR$(149);CHR$(149);
640 LOCATE 1,10
650 PEN 1:PRINT CHR$(149);CHR$(32);
660 PEN 2:PRINT CHR$(149);CHR$(149);
670 PEN 3:PRINT CHR$(32);CHR$(149);
680 PEN 4:PRINT CHR$(149);CHR$(32);
690 PEN 5:PRINT ,CHR$(149);CHR$(149);
700 PEN 6:PRINT CHR$(32);CHR$(210);
710 PEN 7:PRINT CHR$(151);CHR$(152);
720 PEN 8:PRINT CHR$(151);CHR$(158);
730 PEN 9:PRINT CHR$(153);CHR$(147);
740 PEN 10:PRINT CHR$(154);CHR$(156);
750 LOCATE 1,11
760 PEN 1:PRINT CHR$(149);CHR$(32);
770 PEN 2:PRINT CHR$(149);CHR$(149);
780 PEN 3:PRINT CHR$(32);CHR$(149);
790 PEN 4:PRINT CHR$(149);CHR$(32);
800 PEN 5:PRINT CHR$(149);CHR$(149);
810 PEN 6:PRINT CHR$(32);CHR$(149);
820 PEN 7:PRINT CHR$(149);CHR$(32);
830 PEN 8:PRINT CHR$(149);CHR$(193);
840 PEN 9:PRINT CHR$(195);CHR$(32);
850 PEN 10:PRINT CHR$(32);CHR$(149);
860 LOCATE 1,12
870 PEN 1:PRINT CHR$(155);CHR$(154);
880 PEN 2:PRINT CHR$(153);CHR$(147);
890 PEN 3:PRINT CHR$(154);CHR$(153);
900 PEN 4:PRINT CHR$(155);CHR$(154);
910 PEN 5:PRINT CHR$(153);CHR$(147);
920 PEN 6:PRINT CHR$(154);CHR$(153);
930 PEN 7:PRINT CHR$(147);CHR$(154);
940 PEN 8:PRINT CHR$(145);CHR$(32);
950 PEN 9:PRINT CHR$(145);CHR$(147);
960 PEN 10:PRINT CHR$(154);CHR$(153);
970 LOCATE 3,17:PEN 2:PRINT "COPYRIGHT 1
   985 $"
980 TAG:PLOT -10,10,14:MOVE 5,48:PRINT "
      LOADING...";:TAGOFF
990 LOCATE 1,23:PEN 15:PRINT CHR$(22)+CH
   R$(1);"     LOADING...";CHR$(22)+CHR
   $(0);
1000 ENT -1,10,-5,1:ENT -14,2,10,1,1,-10
   ,1,2,10,1,3,-8,1:ENT -2,5,-5,1,2,5,
   1
1010 ENT -6,6,1,1,1,-8,1:ENT -11,6,2,4,1
   ,-6,1
1020 ENV 2,1,0,20,14,-1,8
1030 PEN 0
1040 RUN "!."
```

listing 2

```
30 HSC1=0.005:HSC2=0.004:HSC3=0.003:HSC4
   =0.002:HSC5=0.001
40 HSC1$="YUGGY THE wEirdO":HSC2$="":HSC
   3$="LONGY THE FREAK":HSC4$="Take a tr
   ip in DALIS CAR":HSC5$="TONES ON TAIL
   "
50 PAPER 0:MODE 1:CLS:FOR A=0 TO 15:INK
   A,0:NEXT:INK 1,6:INK 2,2:INK 3,18:BOR
   DER 0:PEN 0
60 ENT 1,10,5,1:ENT -9,239,20,1:ENV 9,7,
   -2,2
70 SYMBOL 96,&FF,&3C,&3C,&3C,&3C,&3C,&3C
610 NEXT:GOTO 600
   ,&FF
80 SYMBOL 92,&3C,&4A,&A9,&89,&89,&91,&52
   ,&3C
90 SYMBOL 236,&0,&0,&E9,&A9,&E9,&8D:SYMB
   OL 237,&0,&0,&D4,&5C,&C4,&5C:SYMBOL 2
   38,&0,&0,&4E,&4A,&4A,&6E:SYMBOL 239,&
   0,&0,&AC,&AA,&AA,&EC
100 SYMBOL 46,&0,&0,&0,&0,&0,&0,&0,&0
110 SYMBOL 195,&40,&40,&40,&71,&4A,&4A,&
   31:SYMBOL 196,&0,&0,&0,&92,&52,&52,&
   CC:SYMBOL 197,&80,&80,&80,&E3,&94,&9
   4,&93:SYMBOL 198,&0,&0,&0,&25,&A5,&A
   4,&99:SYMBOL 199,&0,&0,&0,&C0,&80,&4
   0,&80
120 SYMBOL 244,&C,&C,&C,&F,&1D,&F9,&E3:S
   YMBOL 245,&23,&63,&F1,&F9,&F3,&9B,&F
   :SYMBOL 246,&E0,&F9,&9B,&FB,&E7,&6,&
   C:SYMBOL 247,&87,&C7,&43,&C3,&E6,&66
   ,&36:SYMBOL 254,&C,&C,&8C,&D8,&78,&3
   8,&18
130 SYMBOL 45,&0,&0,&0,&0,&0,&18,&18
140 SYMBOL 91,&91,&A,&4D,&15,&52,&2D,&A6
   ,&9:SYMBOL 93,&44,&E8,&A0,&4A,&F3,&2
   C,&C0,&21
150 SYMBOL 126,&F0,&3C,&1E,&1E,&1E,&1E,&
   3C,&F0
160 PAPER 0:LOCATE 12,1:PEN 3:PRINT CHR$
   (150);CHR$(154);CHR$(154);CHR$(154);
   CHR$(154);CHR$(154);CHR$(154);CHR$(1
   54);CHR$(154);CHR$(154);CHR$(154);CH
   R$(154);CHR$(154);CHR$(154);CHR$(154
   );CHR$(154);CHR$(156)
170 LOCATE 12,2:PRINT CHR$(149):LOCATE 2
   8,2:PRINT CHR$(149)
180 LOCATE 12,3:PRINT CHR$(147);CHR$(154
   );CHR$(154);CHR$(154);CHR$(154);CHR$
   (154);CHR$(154);CHR$(154);CHR$(154);
   CHR$(154);CHR$(154);CHR$(154);CHR$(1
   54);CHR$(154);CHR$(154);CHR$(154);CH
   R$(153)
190 LOCATE 13,2:PEN 2:PRINT " UCK   OD
   GERS"
200 WINDOW #1,1,40,5,24
210 LOCATE 9,6:PEN 1:PRINT "By Nick Spea
   kman ";CHR$(164);" 1985"
220 LOCATE 11,12:PEN 3:PRINT CHR$(150);C
   HR$(154);CHR$(156)
230 LOCATE 11,13:PRINT CHR$(149);"i";CHR
   $(149);CHR$(146);CHR$(154);CHR$(154)
   ;CHR$(154);CHR$(243);" Instuctions"

240 LOCATE 11,14:PRINT CHR$(147);CHR$(15
   4);CHR$(153)
250 LOCATE 11,19:PRINT CHR$(150);CHR$(15
   4);CHR$(156)
260 LOCATE 11,20:PRINT CHR$(149);"S";CHR
   $(149);CHR$(146);CHR$(154);CHR$(154)
   ;CHR$(154);CHR$(243);" Start"
270 LOCATE 11,21:PRINT CHR$(147);CHR$(15
   4);CHR$(153)
280 IF INKEY(35)<>-1 THEN GOSUB 310:GOTO
    50
290 IF INKEY(60)<>-1 THEN GOTO 630
300 GOTO 280
310 '  INSTRUCTIONS
320 CLS #1
330 PEN 2:PRINT #1,"  You are the famous
     UCK   ODGERS,
                              protector
   of the universe-
                   "
340 PRINT #1,"  Your mission is to rid t
   he water
                         covered planet,L
   illypond of the evil
                                 Elmer Fu
   dd-                              "
350 PRINT #1,"  He has positioned his tr
   oops all over
                         the planet's sur
   face-You must destroy   "
360 PRINT #1,"  them and also navigate t
   hrough the
                         laser pylons sca
   ttered over the
                                 planet-"
370 LOCATE 7,25 :PEN 2:PRINT "Press any
   key to continue"
380 FOR SCAN=0 TO 77:IF INKEY(SCAN)<>-1
   THEN 400
390 NEXT :GOTO 380
400 CLS #1 :PEN 2:PRINT #1,"
                                   Once y
   ou have navigated through

     the pylons you automatically begin
   "
410 PRINT #1,"  to orbit the planet-Howe
   ver Elmer's
                         space patrol als
   o orbits the planet
                                 and will
    begin to attack you-"
420 FOR SCAN=0 TO 77:IF INKEY(SCAN)<>-1
   THEN 440
430 NEXT :GOTO 420
440 CLS #1
450 PEN 2:PRINT #1,"
                         After flying f
   or so long your fuel
                                   reserv
   es will be low and you will

     have to refuel off a passing    "
460 PRINT #1,"
                     tanker,before it fli
   es off-Don't be
                              trigger happ
   y or your mission will be
                                     shor
   tened considerably-"
470 FOR SCAN=0 TO 77:IF INKEY(SCAN)<>-1
   THEN 490
480 NEXT :GOTO 470
490 CLS #1:PRINT #1,"
                              To control yo
   ur fighter use the
                                    curso
   r keys or joystick and to fire     "
500 PRINT #1,"  use the FIRE button or C
   OPY-
                         Your fighter has
    variable speed and              "

510 PRINT #1,"  to accelerate or deceler
   ate use up
                         and down respect
   ively"
520 FOR SCAN=0 TO 77:IF INKEY(SCAN)<>-1
   THEN 540
530 NEXT:GOTO 520
540 CLS #1
550 PEN 2:LOCATE #1,5,3:PRINT #1,HSC1$:L
   OCATE #1,30,3:PRINT #1,USING ".#####
   ";HSC1
560 LOCATE #1,5,6:PRINT #1,HSC2$:LOCATE
   #1,30,6:PRINT #1,USING ".#####";HSC2
570 LOCATE #1,5,9:PRINT #1,HSC3$:LOCATE
   #1,30,9:PRINT #1,USING ".#####";HSC3
580 LOCATE #1,5,12:PRINT #1,HSC4$:LOCATE
    #1,30,12:PRINT #1,USING ".#####";HS
   C4
590 LOCATE #1,5,15:PRINT #1,HSC5$:LOCATE
    #1,30,15:PRINT #1,USING ".#####";HS
   C5
600 FOR SCAN=0 TO 77:IF INKEY(SCAN)<>-1
   THEN 620
```

```
620 RETURN
630 YL=22:XL=11:REG=99:SPEED INK 2,2:MODE 0:BORDER 0:INK 0,0:FOR A=2 TO 15:INK A,0:NEXT
640 WIG=0:WOG=1:YUG=0
650 TE=10:EL=11:TW=12:LIES=3:SC=0:LI=5:RI=4:A=10:C=0:L=18:DV=0.0001
660 ALI=1:BAS=1:ZOOM=7
670 INK 2,2:INK 3,18
680 LOCATE 3,13:PEN 3:PRINT CHR$(147);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(153)
690 LOCATE 3,11:PEN 3:PRINT CHR$(150);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(154);CHR$(156)
700 LOCATE 3,12:PRINT CHR$(149):LOCATE 18,12:PRINT CHR$(149)
710 LOCATE 4,12:PEN 2:PRINT "Planet Surface"
720 SYMBOL 192,&FF,&FF,&FF,&FF,&FF,&FF,&FF,&0:SYMBOL 193,&0,&0,&FF,&FF,&FF,&FF,&FF,&FF:SYMBOL 194,&0,&0,&0,&FF,&FF,&FF,&FF,&FF
730 SYMBOL 201,&7F,&FF,&FF,&FF,&FF,&FF,&FF,&FF:SYMBOL 190,&FF,&FF,&FF,&FF,&FF,&FF,&FF,&FF:SYMBOL 191,&0,&FF,&FF,&FF,&FF,&FF,&FF,&FF
740 FOR W=1 TO L:MOVE 0,C:DRAW 637,C,A:C=C+2:NEXT W:A=A+1
750 IF A=13 THEN A=10
760 L=L-(SQR(L)*0.333)
770 IF C<292 THEN 740
780 PAPER 0
790 GOSUB 1170
800 GOSUB 1310
810 GOSUB 1820
820 PEN 1:LOCATE 1,1:PRINT"SCORE       SHIPS"
830 LOCATE 6,1:PEN 13:PRINT USING ".#####";SC;:LOCATE 18,1:PRINT LIES;
840 INK 7,6,15:INK 1,15:INK 9,8:INK 13,19:INK 14,4:INK 15,26:INK 8,3
850 INK 6,6:INK 5,9:INK 4,18:INK 3,12:INK 2,24
860 SUB=REG:INK 10,11:INK 11,11:INK 12,1
870 IF ALI=1 OR ALI=2 OR ALI=3 OR ALI=6 THEN 940
880 IF INKEY(74)<>-1 OR INKEY(8)<>-1 THEN GOSUB 1850
890 IF INKEY(75)<>-1 OR INKEY(1)<>-1 THEN GOSUB 1910
900 IF INKEY(68)<>-1 THEN GOTO 4490
910 IF INKEY(72)<>-1 OR INKEY(0)<>-1 THEN GOSUB 2670
920 IF INKEY(73)<>-1 OR INKEY(2)<>-1 THEN GOSUB 2700
930 IF INKEY(76)<>-1 OR INKEY(9)<>-1 THEN GOSUB 2730
940 IF ALI=1 THEN GOSUB 1970
950 IF ALI=4 THEN GOSUB 2200
960 FOR Q=1 TO SUB:NEXT Q
970 SUB=REG:INK 10,11:INK 11,1:INK 12,11
980 IF ALI=1 OR ALI=2 OR ALI=3 OR ALI=6 THEN 1040
990 IF INKEY(74)<>-1 OR INKEY(8)<>-1 THEN GOSUB 1850
1000 IF INKEY(75)<>-1 OR INKEY(1)<>-1 THEN GOSUB 1910
1010 IF INKEY(72)<>-1 OR INKEY(0)<>-1 THEN GOSUB 2670
1020 IF INKEY(73)<>-1 OR INKEY(2)<>-1 THEN GOSUB 2700
1030 IF INKEY(76)<>-1 OR INKEY(9)<>-1 THEN GOSUB 2730
1040 IF ALI=2 THEN GOSUB 2070
1050 FOR Q=1 TO SUB:NEXT Q
1060 SUB=REG:INK 10,1:INK 11,11:INK 12,11
1070 IF ALI=1 OR ALI=2 OR ALI=3 OR ALI=6 THEN 1130
1080 IF INKEY(74)<>-1 OR INKEY(8)<>-1 THEN GOSUB 1850
1090 IF INKEY(75)<>-1 OR INKEY(1)<>-1 THEN GOSUB 1910
1100 IF INKEY(72)<>-1 OR INKEY(0)<>-1 THEN GOSUB 2670
1110 IF INKEY(73)<>-1 OR INKEY(2)<>-1 THEN GOSUB 2700
1120 IF INKEY(76)<>-1 OR INKEY(9)<>-1 THEN GOSUB 2730
1130 IF ALI=3 THEN GOSUB 2140
1140 IF ALI=6 THEN GOSUB 2310
1150 FOR Q=1 TO SUB:NEXT Q
1160 GOTO 860
1170 MOVE 0,293:DRAW 640,293,10
1180 MOVE 0,295:DRAW 640,295,11
1190 MOVE 0,297:DRAW 640,297,12
1200 MOVE 0,299:DRAW 640,299,10
1210 MOVE 0,301:DRAW 640,301,11
1220 MOVE 0,302:DRAW 640,302,14
1230 MOVE 0,32:DRAW 640,32,11
1240 MOVE 0,34:DRAW 640,34,11
1250 MOVE 0,30:DRAW 640,30,11
1260 RANDOMIZE TIME:FOR ST=1 TO 50
1270 XX%=RND*630+6:YY%=RND*85+305
1280 PLOT XX%,YY%,15
1290 NEXT ST
1300 RETURN
1310 SYMBOL 200,&0,&0,&1,&1,&3,&37,&7F,&FF
1320 SYMBOL 180,&0,&0,&1,&3,&7,&1F,&7F,&FF
1330 SYMBOL 181,&0,&0,&80,&C0,&E0,&F8,&FE,&FF
1340 SYMBOL 182,&1,&3,&87,&FF,&FF,&7,&1,&0
1350 SYMBOL 183,&C7,&83,&1,&1,&83,&C7,&FF,&FF
1360 SYMBOL 184,&E3,&C1,&80,&80,&C1,&E3,&FF,&FF
1370 SYMBOL 185,&80,&C0,&E1,&FF,&FF,&E0,&80,&0
1380 SYMBOL 186,&0,&3,&F,&3F,&E6,&3F,&F,&3
1390 SYMBOL 187,&0,&C0,&F0,&FC,&67,&FC,&F0,&C0
1400 SYMBOL 202,&0,&0,&1,&D,&1F,&1F,&3F,&7F
1410 SYMBOL 188,&0,&3,&3F,&E6,&E6,&3F,&3,&0
1420 SYMBOL 189,&7E,&FF,&FF,&66,&66,&FF,&FF,&7E
1430 SYMBOL 190,&0,&C0,&FC,&67,&67,&FC,&C0,&0
1440 SYMBOL 191,&0,&7,&1F,&66,&1F,&7,&0,&0
1450 SYMBOL 192,&F8,&FF,&FF,&66,&FF,&FF,&F8,&0
1460 SYMBOL 193,&0,&0,&C0,&70,&C0,&0,&0,&0
1470 SYMBOL 203,&F8,&F8,&FC,&FD,&FF,&FF,&FF,&FF
1480 SYMBOL 204,&79,&F8,&F8,&F8,&F8,&F8,&F8,&F8
1490 SYMBOL 205,&7,&3,&C0,&E0,&F0,&F8,&FC,&FC
1500 SYMBOL 206,&0,&80,&80,&40,&20,&21,&11,&0
1510 SYMBOL 207,&FE,&FE,&FF,&7F,&1F,&F,&7,&3
1520 SYMBOL 208,&38,&38,&74,&F2,&F1,&F8,&FC,&FE
1530 SYMBOL 209,&7,&7,&1F,&7F,&FF,&FF,&FF,&FF
1540 SYMBOL 210,&0,&0,&0,&0,&80,&60,&11,&0
1550 SYMBOL 211,&FE,&FF,&FF,&FF,&FF,&FF,&FF,&FF
1560 SYMBOL 212,&0,&1C,&1C,&7C,&7C,&FC,&FE,&FE
1570 SYMBOL 213,&4,&3,&0,&E0,&F8,&FE,&FF,&FF
1580 SYMBOL 214,&0,&80,&40,&20,&20,&20,&18,&4
1590 SYMBOL 215,&0,&0,&80,&80,&60,&18,&84,&82
1600 SYMBOL 216,&0,&0,&0,&0,&8,&14,&32,&7A
1610 SYMBOL 217,&0,&0,&0,&0,&0,&0,&0,&10
1620 SYMBOL 178,&0,&0,&0,&0,&19:SYMBOL 179,&0,&0,&0,&0,&98
1630 SYMBOL 46,&0,&0,&0,&0,&0,&0,&0,&0
1640 SYMBOL 45,&0,&0,&0,&0,&0,&18,&18
1650 SYMBOL 64,&0,&0,&0,&7E
1660 SYMBOL 218,&0,&0,&0,&0,&0,&0,&0,&6
1670 PEN 14:LOCATE 2,6:PRINT CHR$(200);CHR$(201);CHR$(203);CHR$(205);CHR$(207);CHR$(209);CHR$(211);CHR$(213);CHR$(215); CHR$(200);CHR$(201);CHR$(203);CHR$(205);CHR$(207);CHR$(209);CHR$(211);CHR$(213);CHR$(215)
1680 LOCATE 3,5:PRINT CHR$(202);CHR$(204);CHR$(206);CHR$(208);CHR$(210);CHR$(212);CHR$(214);CHR$(32);CHR$(32);CHR$(202);CHR$(204);CHR$(206);CHR$(208);CHR$(210);CHR$(212);CHR$(214);CHR$(32)
1690 LOCATE 4,4:PRINT CHR$(216);CHR$(32);CHR$(217);CHR$(32);CHR$(218);CHR$(32);CHR$(32);CHR$(32);CHR$(32);CHR$(216);CHR$(32);CHR$(217);CHR$(32);CHR$(218)
1700 'MUNTINS
1710 FOR A=1 TO 18:READ X,Y,XX,YY:MOVE X,Y:DRAW XX,YY,9:NEXT A
1720 DATA 115,343,115,339,116,340,116,317,121,338,121,313,124,334,124,314,128,333,128,317,132,329,132,317,136,327,136,315,140,322,140,313,144,321,144,310,148,318,148,308,152,316,152,305,156,315,156,305,160,312,160,305,164,310
1730 DATA 164,305,168,310,168,305,172,308,172,305,176,306,176,305,180,304,180,305
1740 RESTORE
1750 FOR A=1 TO 18:READ X,Y,XX,YY:MOVE X+289,Y:DRAW XX+289,YY,9:NEXT A
1760 MOVE 401,343:DRAW 401,339
1770 FOR A=1 TO 9:READ X,Y,YY:MOVE X,Y:DRAW X,YY:MOVE X+289,Y:DRAW X+289,YY:NEXT A
1780 DATA 178,337,327,182,330,324,186,328,322,190,326,317,194,326,313,198,324,315,202,324,315,206,322,317,210,321,317
1790 FOR A=1 TO 17:READ X,Y,YY:MOVE X,Y:DRAW X,YY:MOVE X+289,Y:DRAW X+289,YY:NEXT A
1800 DATA 250,337,324,254,334,318,258,332,315,262,330,315,266,328,314,270,324,312,274,322,312,278,320,310,282,317,310,286,317,309,290,314,309,294,310,304,298,311,304,302,309,304,306,309,304,310,307,304,314,305,304
1810 RETURN
1820 'CRAFT BUILD
1830 LOCATE 10,22:PEN 8:PAPER 11:PRINT CHR$(180);CHR$(181)
1840 LOCATE 9,23:PRINT CHR$(182);:PAPER 7:PRINT CHR$(183);CHR$(184);:PAPER 11:PRINT CHR$(185):PAPER 0
1850 'LEFT
1860 SUB=REG-65
1870 XL=XL-1:IF XL=1 THEN XL=2
1880 LOCATE XL,YL:PEN 8:PAPER EL:PRINT CHR$(180);CHR$(181):LOCATE XL-1,YL+1:PRINT CHR$(182);:PAPER 7:PRINT CHR$(183);CHR$(184);:PAPER EL:PRINT CHR$(185)
1890 LOCATE XL+2,YL:PRINT " ";:LOCATE XL+3,YL+1:PRINT " ";:PAPER 0
1900 RETURN
1910 'RIGHT
1920 SUB=REG-65
1930 XL=XL+1:IF XL=19 THEN XL=18
1940 LOCATE XL,YL:PEN 8:PAPER EL:PRINT CHR$(180);CHR$(181):LOCATE XL-1,YL+1:PRINT CHR$(182);:PAPER 7:PRINT CHR$(183);CHR$(184);:PAPER EL:PRINT CHR$(185)
1950 LOCATE XL-1,YL:PRINT " ";:LOCATE XL-2,YL+1:PRINT " ";:PAPER 0
1960 RETURN
1970 'ALIEN BIT
1980 SUB=REG
1990 APOS=INT(RND*16)+3:IF APOS=11 THEN APOS=INT(RND*16)+3
2000 IF APOS>10 THEN 2030
2010 SOUND 1,300,150,7,2,11
2020 GOTO 2040
2030 SOUND 4,300,150,7,2,11
2040 LOCATE APOS-1,25 :PAPER TE:PEN LI:PRINT CHR$(188);:PRINT CHR$(189);:PEN RI:PRINT CHR$(190);
2050 ALI=2
2060 RETURN
2070 SUB=REG-20
2080 LOCATE APOS-1,25:PRINT "   "
2090 IF APOS>XL-1 AND APOS<XL+2 THEN GOSUB 2530
2100 LOCATE APOS-1,20:PAPER TW
2110 PEN LI:PRINT CHR$(191);:PRINT CHR$(192);:PEN RI:PRINT CHR$(193);
2120 ALI=3
2130 RETURN
2140 SUB=REG-20
2150 LOCATE APOS-1,20:PRINT "   "
2160 LOCATE APOS-1,17:PAPER EL
2170 PEN LI:PRINT CHR$(186);:PEN RI:PRINT CHR$(187);
2180 ALI=4
2190 RETURN
2200 YUG=YUG+1:IF YUG=ZOOM THEN ALI=6:SUB=REG-20
2210 MOV=INT(RND*2)+BAS
2220 IF MOV=1 THEN 2270
2230 APOS=APOS-1:IF APOS<2 THEN APOS=APOS+1
2240 PAPER EL:LOCATE APOS,17:PEN LI:PRINT CHR$(186);:PEN RI:PRINT CHR$(187);
2250 LOCATE APOS+2,17:PRINT "  "
2260 RETURN
2270 APOS=APOS+1:IF APOS>17 THEN APOS=APOS-1
2280 PAPER EL:LOCATE APOS,17:PEN LI:PRINT CHR$(186);:PEN RI:PRINT CHR$(187);
2290 LOCATE APOS-2,17:PRINT "  "
2300 RETURN
2310 YUG=0:SUB=REG-20:ALI=4
2320 LOCATE 1,17:PRINT SPACE$(19)
2330 LOCATE APOS-1,20:PAPER TW:PEN LI:PRINT CHR$(191);:PRINT CHR$(192);:PEN RI:PRINT CHR$(193);
2340 FOR A=1 TO 55:NEXT
2350 LOCATE APOS-1,20:PAPER TW:PRINT "   ";
2360 LOCATE APOS-1,25 :PAPER TE:PEN LI:PRINT CHR$(188);:PRINT CHR$(189);:PEN RI:PRINT CHR$(190);
2370 FOR A=1 TO 55:NEXT
2380 LOCATE APOS-1,25 :PAPER TE:PRINT "   ";
2390 IF APOS>XL-1 AND APOS<XL+2 THEN GOSUB 2530
2400 ALI=1
2410 RETURN
2420 'HIT BIT
2430 PAPER EL:LOCATE XL,17:PRINT "[]":SOUND 2,10,10,7,9,1,31
2440 WIG=WIG+WOG
2450 APOS=0:SC=SC+DV
2460 LOCATE 6,1:PAPER 0:PEN 13:PRINT USING ".#####";SC
2470 PAPER EL:LOCATE 1,17:PRINT SPACE$(19)
2480 IF WIG>10 THEN DV=0.00015:LI=8:RI=6:ZOOM=6
2490 IF WIG>16 THEN DV=0.0002:LI=3:RI=2:BAS=2
2500 IF WIG=21 THEN GOTO 4490
2510 ALI=1
2520 RETURN
2530 '+++++R.I.P.+++++
2540 SUB=REG:SOUND 1,650,100,7,2,14
2550 SYMBOL 180,&0,&0,&0,&1,&3,&5,&1D,&77 :SYMBOL 181,&0,&0,&0,&80,&40,&40,&B8,&EA:SYMBOL 182,&1,&1,&83,&66,&DB:SYMBOL 183,&D6,&7A,&55,&AB,&57,&CD,&39,&EA:SYMBOL 184,&D7,&52,&AB,&7D,&A4,&57,&29,&CF:SYMBOL 185,&80,&80,&41,&00,&E5,&40,&80
2560 LOCATE XL,YL:PEN 8:PAPER EL:PRINT CHR$(180);CHR$(181):LOCATE XL-1,YL+1:PRINT CHR$(182);:PAPER EL:PRINT CHR$(183);CHR$(184);:PAPER EL:PRINT CHR$(185)
2570 SOUND 2,700,100,7,2,14
2580 FOR A=1 TO 222:NEXT
2590 SYMBOL 180,&0,&0,&0,&1,&8,&0,&2,&12:SYMBOL 181,&0,&0,&0,&0,&0,&C0,&50,&14:SYMBOL 182,&0,&0,&1,&86:SYMBOL 183,&A3,&48,&AD,&42,&89,&42,&90,&65:SYMBOL 184,&95,&22,&4,&91,&28,&2,&80,&29:SYMBOL 185,&0,&0,&0,&5,&93,&0,&8
2600 LOCATE XL,YL:PEN 8:PAPER EL:PRINT CHR$(180);CHR$(181):LOCATE XL-1,YL+1:PRINT CHR$(182);:PAPER EL:PRINT CHR$(183);CHR$(184);:PAPER EL:PRINT CHR$(185)
2610 LIES=LIES-1:IF LIES<1 THEN GOTO 4230
2620 PAPER 0:PEN 13:LOCATE 18,1:PRINT LIES;
2630 FOR A=1 TO 222:NEXT
2640 SYMBOL 180,&0,&0,&1,&3,&7,&1F,&7F,&FF:SYMBOL 181,&0,&0,&80,&C0,&E0,&F8,&FE,&FF:SYMBOL 182,&1,&3,&87,&FF,&FF,&7,&1,&0:SYMBOL 183,&C7,&83,&1,&1,&83,&C7,&FF,&FF:SYMBOL 184,&E3,&C1,&80,&80,&C1,&E3,&FF,&FF:SYMBOL 185,&80,&C0,&E1,&FF,&FF,&E0,&80,&0
2650 LOCATE XL,YL:PEN 8:PAPER EL:PRINT CHR$(180);CHR$(181):LOCATE XL-1,YL+1
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    :PRINT CHR$(182);:PAPER 7:PRINT CHR
    $(183);CHR$(184);:PAPER EL:PRINT CH
    R$(185)
2660 RETURN
2670 'FAST
2680 REG=SUB-4:IF REG<45 THEN REG=50
2690 RETURN
2700 'SLOW
2710 REG=SUB+3:IF REG>175 THEN REG=170
2720 RETURN
2730 'FIRE
2740 SUB=REG-120
2750 SOUND 2,60,0,3,9,9
2760 SYMBOL 220,&0,&1,&1,&1,&1,&1,&1
2770 PEN 15:PAPER TW:LOCATE XL,20:PRINT
    CHR$(220);
2780 SYMBOL 220,&0,&0,&0,&1,&1,&1,&1
2790 LOCATE XL,20:PRINT CHR$(32)
2800 PAPER EL:LOCATE XL,17:PRINT CHR$(22
    0)
2810 SYMBOL 220,&0,&0,&0,&0,&0,&1,&1
2820 LOCATE XL,17:PRINT CHR$(32);
2830 LOCATE XL,13:PRINT CHR$(220);:LOCAT
    E XL,13:PRINT CHR$(32);
2840 IF XL=APOS+1 THEN PAPER EL:PEN RI:L
    OCATE APOS+1,17:PRINT CHR$(187)
2850 IF XL=APOS THEN GOSUB 2420
2860 RETURN
2870 'UP UP & AWAY
2880 NUMB=0:WIG=0:WOG=0
2890 PAPER 11:LOCATE 1,17:PRINT SPACE$(2
    0)
2900 PAPER 0:INK 10,5:INK 11,5:INK 12,5
2910 FOR A=1 TO 15
2920 LOCATE 1,1:PRINT SPACE$(20)
2930 PRINT CHR$(11);:PRINT CHR$(11);:PRI
    NT CHR$(11);:PRINT CHR$(11);
2940 LOCATE XL,YL:PEN 8:PAPER EL:PRINT C
    HR$(180);CHR$(181):LOCATE XL-1,YL+1
    :PRINT CHR$(182);:PAPER 7:PRINT CHR
    $(183);CHR$(184);:PAPER EL:PRINT CH
    R$(185)
2950 LOCATE XL-1,YL+2:PAPER EL:PRINT "
      ";:PAPER 0
2960 PRINT CHR$(11);:PRINT CHR$(11);:PRI
    NT CHR$(11);CHR$(11);CHR$(11);CHR$(
    11);CHR$(11); CHR$(11);CHR$(11);
2970 FOR ST=1 TO 9:XX%=RND*630+6:YY%=RND
    *10+370:PLOT XX%,YY%,15:NEXT ST
2980 NEXT
2990 LOCATE 1,1:PRINT SPACE$(20)
3000 PRINT CHR$(11);CHR$(11);CHR$(11);CH
    R$(11);
3010 LOCATE XL,YL:PEN 8:PAPER 14:PRINT C
    HR$(180);CHR$(181):LOCATE XL-1,YL+1
    :PAPER EL:PRINT CHR$(182);:PAPER 7:
    PRINT CHR$(183);CHR$(184);:PAPER EL
    :PRINT CHR$(185)
3020 LOCATE XL-1,YL+2:PAPER EL:PRINT "
      ";
3030 PRINT CHR$(11);CHR$(11);CHR$(11);CH
    R$(11);CHR$(11);CHR$(11);CHR$(11);C
    HR$(11);CHR$(11);
3040 FOR ST=1 TO 9:XX%=RND*630+6:YY%=RND
    *10+370:PLOT XX%,YY%,15:NEXT ST
3050 PAPER 0:LOCATE 1,1:PRINT "
              "
3060 PRINT CHR$(11);CHR$(11);CHR$(11);CH
    R$(11);
3070 LOCATE XL,YL:PEN 8:PAPER 0:PRINT CH
    R$(180);CHR$(181):LOCATE XL-1,YL+1:
    PAPER 14:PRINT CHR$(182);:PAPER 7:P
    RINT CHR$(183);CHR$(184);:PAPER 14:
    PRINT CHR$(185)
3080 LOCATE XL-1,YL+2:PAPER EL:PRINT "
      ";:PAPER 0
3090 PRINT CHR$(11);CHR$(11);CHR$(11);CH
    R$(11); CHR$(11);CHR$(11);CHR$(11);
    CHR$(11);CHR$(11);
3100 FOR ST=1 TO 9:XX%=RND*630+6:YY%=RND
    *10+370:PLOT XX%,YY%,15:NEXT ST
3110 NOB=14
3120 FOR A=1 TO 6
3130 IF A=2 THEN NOB=0
3140 LOCATE 1,1:PRINT SPACE$(20)
3150 PRINT CHR$(11);:PRINT CHR$(11);:PRI
    NT CHR$(11);:PRINT CHR$(11);
3160 LOCATE XL,YL:PEN 8:PAPER 0:PRINT CH
    R$(180);CHR$(181):LOCATE XL-1,YL+1:
    PRINT CHR$(182);:PAPER 7:PRINT CHR$
    (183);CHR$(184);:PAPER 0:PRINT CHR$
    (185)
3170 LOCATE XL-1,YL+2:PAPER NOB:PRINT "
      ";:PAPER 0
3180 PRINT CHR$(11);:PRINT CHR$(11);:PRI
    NT CHR$(11);:PRINT CHR$(11); :PRINT
     CHR$(11);:PRINT CHR$(11);:PRINT CH
    R$(11); :PRINT CHR$(11);:PRINT CHR$
    (11);
3190 FOR ST=1 TO 9:XX%=RND*630+6:YY%=RND
    *10+370:PLOT XX%,YY%,15:NEXT ST
3200 NEXT
3210 FOR ST=1 TO 8:XX%=RND*630+6:YY%=RND
    *10+370:PLOT XX%,YY%,15:NEXT ST
3220 TE=0:EL=0:TW=0
3230 PAPER 0:PEN 1:LOCATE 1,1:PRINT"SCOR
    E        SHIPS" :LOCATE 6,1:PEN 13:P
    RINT USING ".#####";SC:PEN 13:LOCAT
    E 18,1:PRINT LIES;
3240 FOR ST=1 TO 3:XX%=RND*630+2:YY%=RND
    *630+2:PLOT XX%,YY%,2:NEXT ST
3250 FOR ST=1 TO 3:XX%=RND*630+2:YY%=RND
    *630+2:PLOT XX%,YY%,6:NEXT ST
3260 FOR ST=1 TO 4:XX%=RND*630+2:YY%=RND
    *630+2:PLOT XX%,YY%,4:NEXT ST
3270 INK 3,18:INK 2,2:LOCATE 4,13:PEN 3:
    PRINT CHR$(147);CHR$(154);CHR$(154)
    ;CHR$(154);CHR$(154);CHR$(154);CHR$
    (154);CHR$(154);CHR$(154);CHR$(154)
    ;CHR$(154);CHR$(154);CHR$(153)
3280 LOCATE 4,11:PRINT CHR$(150);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(154);CHR$(154);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(156)
3290 LOCATE 4,12:PRINT CHR$(149);"
         ";CHR$(149):LOCATE 5,12:PEN 2:
    PRINT "Outer Space";
3300 FOR A=1 TO 1800:NEXT
3310 LOCATE 4,11:PRINT SPACE$(13);:LOCAT
    E 4,12:PRINT SPACE$(13);:LOCATE 4,1
    3:PRINT SPACE$(13);
3320 FOR ST=1 TO 25:XX%=RND*416+128:YY%=
    RND*48+194:PLOT XX%,YY%,15:NEXT ST
3330 DV=0.0003
3340 X=INT(RND*16)+3
3350 IF NUMB>6 THEN GOTO 3740
3360 SYMBOL 230,&1
3370 SYMBOL 222,&0:SYMBOL 223,&0
3380 SYMBOL 231,&80
3390 PAU=120:GOSUB 3650
3400 SYMBOL 230,&0,&1,&1
3410 SYMBOL 231,&0,&80,&80
3420 PAU=60:GOSUB 3650
3430 SYMBOL 230,&0,&0,&4,&3,&3,&4
3440 SYMBOL 222,&0,&0,&0,&1,&1
3450 SYMBOL 231,&0,&0,&40,&80,&80,&40
3460 PAU=40:GOSUB 3650
3470 SYMBOL 230,&0,&10,&8,&7,&7,&8,&10
3480 SYMBOL 222,&0,&0,&0,&3,&3:SYMBOL 22
    3,&0,&0,&0,&80,&80
3490 SYMBOL 231,&0,&10,&20,&C0,&C0,&20,&
    10
3500 PAU=20:GOSUB 3650
3510 SYMBOL 230,&60,&10,&9,&7,&7,&9,&10,
    &60
3520 SYMBOL 222,&0,&0,&1,&3,&3,&1:SYMBOL
     223,&0,&0,&80,&C0,&C0,&80
3530 SYMBOL 231,&6,&8,&90,&E0,&E0,&90,&8
    ,&6
3540 GOSUB 3650
3550 DIF=INT(RND*5)-2:FID=DIF+XL
3560 MOVE X*32,178:DRAW FID*32-4,60,3
3570 FOR A=20 TO 31 STEP 3:SOUND 2,5,5,7
    ,1,1,A:NEXT
3580 LOCATE X,17:PRINT "  ":MOVE X*32,17
    8:DRAW FID*32-4,60,0
3590 IF FID=XL THEN GOSUB 2530
3600 IF X<10 THEN X=X-1:GOSUB 3650
3610 IF X>9 THEN X=X+1:GOSUB 3650
3620 IF X<3 THEN LOCATE X,14:PRINT "  ":
    DED=1
3630 IF X>17 THEN LOCATE X,14:PRINT "  "
    :DED=1
3640 GOTO 3600
3650 IF INKEY(74)<>-1 OR INKEY(8)<>-1 TH
    EN GOSUB 1850:PAU=-40
3660 IF INKEY(75)<>-1 OR INKEY(1)<>-1 TH
    EN GOSUB 1910:PAU=-40
3670 IF INKEY(68)<>-1 THEN GOTO 3740
3680 IF INKEY(76)<>-1 OR INKEY(9)<>-1 TH
    EN GOSUB 2730:PAU=-95:IF XL=X THEN
    LOCATE X-1,14:PEN 7:PRINT " [] ":SO
    UND 1,2,8,7,,9,31:SOUND 2,2,8,7,,9,
    1:SOUND 3,5,8,7,2,9,13:GOSUB 2450:N
    UMB=NUMB+1:LOCATE X-1,14:PRINT "
     ":DED=1
3690 INK 9,12:INK 6,7
3700 IF DED=1 THEN DED=0 :GOTO 3340
3710 FOR A=1 TO 119+PAU :NEXT:LOCATE X-1
    ,14:PEN 9:PRINT CHR$(32);CHR$(230);
    CHR$(231);CHR$(32);
3720 LOCATE X-1,14:PEN 6:PRINT CHR$(22)+
    CHR$(1);CHR$(32);CHR$(222);CHR$(223
    );CHR$(32);:PRINT CHR$(22)+CHR$(0);
3730 RETURN
3740 'GLUG! GLUG!---"OH DEAR !"---BURP!
3750 PEN 3:LOCATE 5,13:PRINT CHR$(147);C
    HR$(154);CHR$(154);CHR$(154);CHR$(1
    54);CHR$(154);CHR$(154);CHR$(154);C
    HR$(154);CHR$(154);CHR$(153)
3760 SOUND 2,12,12,7
3770 LOCATE 5,11:PRINT CHR$(150);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(154);CHR$(154);CHR$(15
    4);CHR$(154);CHR$(156)
3780 LOCATE 5,12:PRINT CHR$(149);"
       ";CHR$(149):LOCATE 6,12:PEN 2:PR
    INT " Warning ";
3790 SOUND 2,12,12,7:FOR A=1 TO 1000:NEX
    T:SOUND 2,12,8,7
3800 LOCATE 6,12:PEN 2:PRINT "Fuel  low"
3810 SOUND 2,12,8,7:FOR A=1 TO 333:NEXT
3820 LOCATE 5,11:PRINT "            ":LOC
    ATE 5,12:PRINT "           ":LOCATE
     5,13:PRINT "          "
3830 FOR ST=1 TO 25:XX%=RND*400+128:YY%=
    RND*48+194:PLOT XX%,YY%,15:NEXT ST
3840 PEN 5
3850 SYMBOL 248,&70,&D8,&88,&D8,&7F,&F,&
    E,&1E
3860 SYMBOL 249,&0,&0,&0,&3C,&FF,&FF
3870 SYMBOL 250,&E,&1B,&11,&1B,&FE,&F0,&
    70,&78
3880 SYMBOL 251,&1E,&E,&F,&7F,&D8,&88,&D
    8,&70
3890 SYMBOL 252,&0,&0,&FF,&FF,&3C
3900 SYMBOL 253,&78,&70,&F0,&FE,&1B,&11,
    &1B,&E
3910 TAG:PLOT 800,800,5:MOVE 272,302:PRI
    NT CHR$(248);CHR$(249);CHR$(250);:M
    OVE 272,302-16:PRINT CHR$(251);CHR$
    (252);CHR$(253):TAGOFF
3920 MOVE 263+16,277:DRAW 269+16,277,7:P
    LOT 266+16,278,7:PLOT 266+16,275,7:
    MOVE 337+16,277:DRAW 344+16,277,7:P
    LOT 342+16,275,7:PLOT 342+16,278,7
3930 MOVE 286+16,291:DRAW 323+16,291,4:M
    OVE 286+16,289:DRAW 323+16,289,4:MO
    VE 286+16,287:DRAW 323+16,287,4:MOV
    E 286+16,284:DRAW 323+16,284,4
3940 MOVE 260+16,299:DRAW 268+16,299,7:P
    LOT 267+16,296,7:PLOT 267+16,300,7
3950 MOVE 339+16,298:DRAW 346+16,298,7:P
    LOT 341+16,297:PLOT 341+16,300
3960 INK 10,0:INK 9,0:INK 14,0:INK 11,0
3970 LX=INT(RND*17+2)
3980 FOR SX=20 TO 11 STEP -1:MOVE LX*32-
    SX,60:DRAW 303+16,278,10:NEXT:FOR S
    X=10 TO 0 STEP -1:MOVE LX*32-SX,60:
    DRAW 303+16,278,9:NEXT:FOR SX=1 TO
    11:MOVE LX*32+SX,60:DRAW 303+17,278
    ,14:NEXT:FOR SX=11 TO 19:MOVE LX*32
    +SX,60:DRAW 303+17,278,11:NEXT
3990 IF INKEY(76)<>-1 OR INKEY(9)<>-1 TH
    EN GOSUB 2730:GOTO 5290
4000 INK 10,1:INK 9,2:INK 14,14:INK 11,2
    0
4010 FOR A=1 TO 40
4020 IF INKEY(74)<>-1 OR INKEY(8)<>-1 TH
    EN GOSUB 1850
4030 IF INKEY(75)<>-1 OR INKEY(1)<>-1 TH
    EN GOSUB 1910
4040 IF INKEY(76)<>-1 OR INKEY(9)<>-1 TH
    EN INK 10,0:INK 9,0:INK 14,0:INK 11
    ,0:GOSUB 2730:GOTO 5290
4050 IF XL=LX THEN 4080
4060 NEXT
4070 LIES=0:GOTO 2530
4080 FOR A=3000 TO 900 STEP -10:SOUND 2,
    A,1,7:NEXT
4090 INK 9,0:INK 10,0:INK 11,0:INK 14,0
4100 FOR A=1 TO 111:NEXT
4110 LOCATE 9,7:PRINT "    ":LOCATE 9,8:
    PRINT "    "
4120 PEN 3:LOCATE 5,13:PRINT CHR$(147);C
    HR$(154);CHR$(154);CHR$(154);CHR$(1
    54);CHR$(154);CHR$(154);CHR$(154);C
    HR$(154);CHR$(154);CHR$(153)
4130 LOCATE 5,11:PRINT CHR$(150);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(154);CHR$(154);CHR$(15
    4);CHR$(154);CHR$(156)
4140 LOCATE 5,12:PRINT CHR$(149);"
       ";CHR$(149):LOCATE 6,12:PEN 2:PR
    INT "Well done";
4150 FOR A=1 TO 1000:NEXT
4160 LOCATE 6,12:PEN 2:PRINT "Re0entry "
4170 FOR A=1 TO 400:NEXT
4180 LOCATE 5,11:PRINT "            ":LOC
    ATE 5,12:PRINT "           ":LOCATE
     5,13:PRINT "          "
4190 YL=22:XL=11:TE=10:EL=11:TW=12:A=10:
    LIES=LIES+3:LI=5:RI=4:C=0:L=18:DV=0
    .0001:ALI=1:BAS=1:ZOOM=7:WOG=1:WIG=
    0
4200 YUG=0
4210 FOR NK=1 TO 15:INK NK,0:NEXT
4220 RESTORE :GOTO 670
4230 'WAIT FOR IT----WAIT FOR IT
4240 INK 13,26,0:FOR A=1 TO 3000:NEXT:PA
    PER 0
4250 IF HSC5<SC THEN GOSUB 4270
4260 RESTORE:GOTO 50
4270 ' MMMMM NOW LET ME SEE
4280 INK 2,2:INK 1,6:INK 3,18
4290 A$=""
4300 MODE 1:CLS: PAPER 0:LOCATE 12,1:PEN
     3:PRINT CHR$(150);CHR$(154);CHR$(1
    54);CHR$(154);CHR$(154);CHR$(154);C
    HR$(154);CHR$(154);CHR$(154);CHR$(1
    54);CHR$(154);CHR$(154);CHR$(154);C
    HR$(154);CHR$(154);CHR$(154);CHR$(1
    56)
4310 LOCATE 12,2:PRINT CHR$(149):LOCATE
    28,2:PRINT CHR$(149)
4320 LOCATE 12,3:PRINT CHR$(147);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(154);CHR$(154);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(154);CHR$(154);CHR$(15
    4);CHR$(153)
4330 LOCATE 13,2:PEN 2:PRINT " UCK   O
    DGERS"
4340 LOCATE 1,7:PEN 1:PRINT "    Congrat
    ulations,you managed to

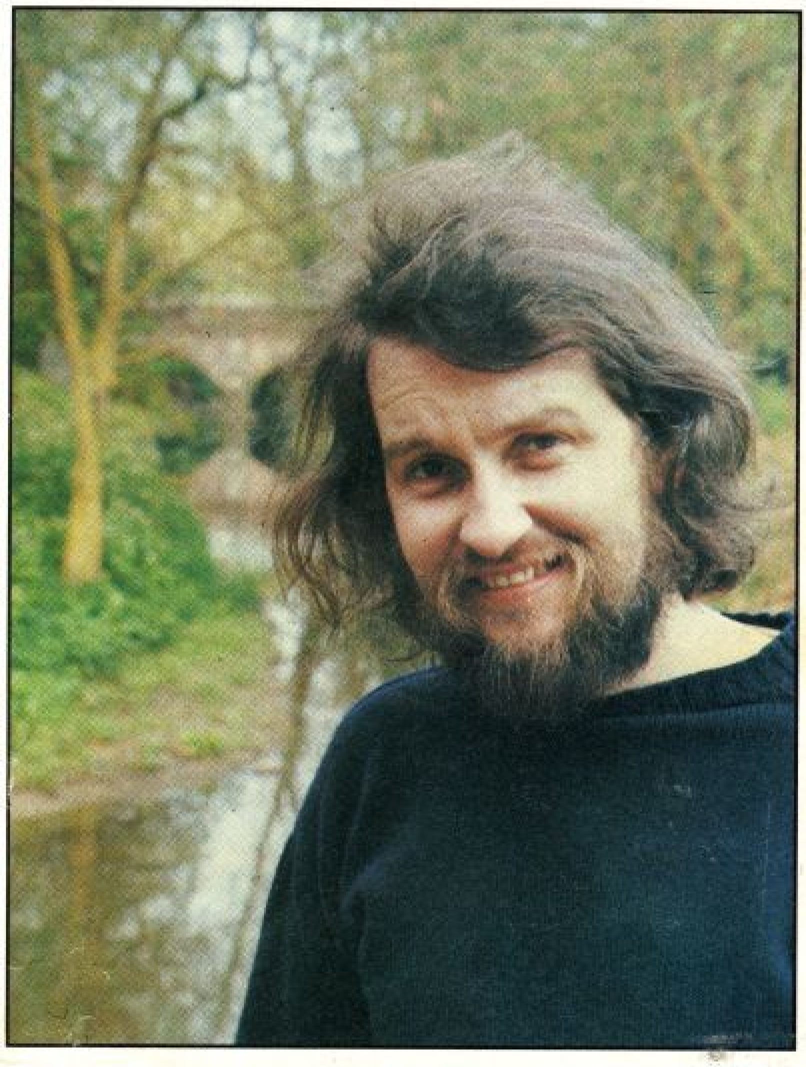
       gain one of the top five scores-

                   Please enter your name
     below-----
4350 CALL &B803
4360 B$=INKEY$
4370 PEN 3:LOCATE 11,18
4380 IF B$=CHR$(13) THEN 4430
4390 A$=A$+B$
4400 PRINT A$
4410 IF LEN(A$)=18 THEN 4430
4420 GOTO 4360
4430 IF SC<HSC4 THEN HSC5=SC:HSC5$=A$
4440 IF SC>=HSC4 AND SC<HSC3 THEN HSC5=H
    SC4:HSC5$=HSC4$:HSC4=SC:HSC4$=A$
4450 IF SC>=HSC3 AND SC<HSC2 THEN HSC5=H
    SC4:HSC5$=HSC4$:HSC4=HSC3:HSC4$=HSC
    3$:HSC3=SC:HSC3$=A$
4460 IF SC>=HSC2 AND SC<HSC1 THEN HSC5=H
    SC4:HSC5$=HSC4$:HSC4=HSC3:HSC4$=HSC
    3$:HSC3=HSC2:HSC3$=HSC2$:HSC2=SC:HS
    C2$=A$
4470 IF SC>=HSC1 THEN HSC5=HSC4:HSC5$=HS
    C4$:HSC4=HSC3:HSC4$=HSC3$:HSC3=HSC2
    :HSC3$=HSC2$:HSC2=HSC1:HSC2$=HSC1$:
    HSC1=SC:HSC1$=A$
4480 RETURN
4490 'PYLON PALAVER
4500 PAPER 10:INK 10,5:INK 11,5:INK 12,5
4510 LOCATE 1,17:PRINT SPACE$(19):INK 9,
    0:INK 14,0:FOR ST=1 TO 27:XX%=RND*6
    30+6:YY%=RND*47+303:PLOT XX%,YY%,15
    :NEXT ST
4520 APOS=0:MOVE 0,302:DRAW 640,302,11
4530 GOSUB 5360
4540 INK 3,18:INK 2,3:LOCATE 4,13:PEN 3:
    PRINT CHR$(147);CHR$(154);CHR$(154)
    ;CHR$(154);CHR$(154);CHR$(154);CHR$
    (154);CHR$(154);CHR$(154);CHR$(154)
    ;CHR$(154);CHR$(154);CHR$(154);CHR$
    (153)
4550 SOUND 2,12,12,7
4560 LOCATE 4,11:PRINT CHR$(150);CHR$(15
```

```
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(154);CHR$(154);CHR$(15
    4);CHR$(154);CHR$(154);CHR$(154);CH
    R$(154);CHR$(156)
4570 LOCATE 4,12:PRINT CHR$(149);"
          ";CHR$(149):LOCATE 6,12:PEN 2
    :PRINT "Warning---";
4580 SOUND 2,12,12,7
4590 FOR A=1 TO 1000:NEXT
4600 SOUND 2,12,8,7
4610 LOCATE 5,12:PEN 2:PRINT "Pylons ahe
    ad"
4620 SYMBOL 226,&18,&7E,&7E,&18,&18,&18,
    &18,&18
4630 SOUND 2,12,8,7
4640 FOR A=1 TO 900:NEXT
4650 SYMBOL 225,&0,&18,&18,&FF,&FF,&18,&
    FF,&FF:SYMBOL 226,&18,&7E,&7E,&18,&
    18,&18,&18,&18:SYMBOL 224,&0,&0,&10
    ,&7C,&10,&7C,&38,&10
4660 SYMBOL 227,&18,&18,&BD,&FF,&FF,&18,
    &99,&FF:SYMBOL 228,&FF,&3C,&18,&99,
    &FF,&FF,&18,&18:SYMBOL 229,&18,&18,
    &18,&18,&18,&18,&18,&3C
4670 SOUND 2,12,12,7
4680 LOCATE 4,13:PRINT "                ";
    :LOCATE 4,11:PRINT "               "
    ;:LOCATE 4,12:PRINT "
    ";
4690 SOUND 2,12,12,7
4700 X=INT(RND*8)+6
4710 FOR COU=1 TO 15
4720 SC=SC+0.0001:LOCATE 6,1:PAPER 0:PEN
     13:PRINT USING ".#####";SC
4730 PAPER 10
4740 LOCATE X,10:PEN 5:PRINT CHR$(224)
4750 MOVE 0,246:DRAW X*32-31,246,7
4760 LOCATE X+2,10:PEN 5:PRINT CHR$(224)
4770 MOVE X*32+56,246:DRAW 640,246,7
4780 SUB=REG-17
4790 FOR Q=1 TO SUB/7
4800 IF INKEY(74)<>-1 OR INKEY(8)<>-1 TH
    EN GOSUB 1850
4810 IF INKEY(75)<>-1 OR INKEY(1)<>-1 TH
    EN GOSUB 1910
4820 IF INKEY(68)<>-1 THEN GOTO 2870
4830 IF INKEY(72)<>-1 OR INKEY(0)<>-1 TH
    EN GOSUB 2670
4840 IF INKEY(73)<>-1 OR INKEY(2)<>-1 TH
    EN GOSUB 2700
4850 IF INKEY(76)<>-1 OR INKEY(9)<>-1 TH
    EN GOSUB 2730
4860 NEXT:PAPER 10:PEN 5
4870 LOCATE X,10:PRINT " ":LOCATE X+2,10
    :PRINT " "
4880 MOVE 0,246:DRAW X*32-31,246,10:MOVE
     X*32+56,246:DRAW 640,246,10
4890 LOCATE X-1,15:PRINT CHR$(225):LOCAT
    E X-1,16:PRINT CHR$(226):LOCATE X+2
    ,15:PRINT CHR$(225):LOCATE X+2,16:P
    RINT CHR$(226)
4900 MOVE 0,165:DRAW X*32-63,165,7
4910 MOVE 0,158:DRAW X*32-63,158,7
4920 MOVE X*32+64,165:DRAW 640,165,7
4930 MOVE X*32+64,158:DRAW 640,158,7
4940 SUB=REG-17
4950 FOR Q=1 TO SUB/7.5
4960 IF INKEY(74)<>-1 OR INKEY(8)<>-1 TH
    EN GOSUB 1850
4970 IF INKEY(75)<>-1 OR INKEY(1)<>-1 TH
    EN GOSUB 1910
4980 IF INKEY(72)<>-1 OR INKEY(0)<>-1 TH
    EN GOSUB 2670
4990 IF INKEY(73)<>-1 OR INKEY(2)<>-1 TH
    EN GOSUB 2700
5000 IF INKEY(76)<>-1 OR INKEY(9)<>-1 TH
    EN GOSUB 2730
5010 NEXT
5020 PAPER 10:PEN 5
5030 LOCATE X-1,15:PRINT " ":LOCATE X-1,
    16:PRINT " ":LOCATE X+2,15:PRINT "
    ":LOCATE X+2,16:PRINT " "
5040 MOVE 0,165:DRAW X*32-63,165,10
5050 MOVE 0,158:DRAW X*32-63,158,10
5060 MOVE X*32+64,165:DRAW 640,165,10
5070 MOVE X*32+64,158:DRAW 640,158,10
5080 LOCATE X-2,20:PRINT CHR$(227):LOCAT
    E X-2,21:PRINT CHR$(228):LOCATE X-2
    ,22:PRINT CHR$(229):LOCATE X+3,20:P
    RINT CHR$(227):LOCATE X+3,21:PRINT
    CHR$(228):LOCATE X+3,22:PRINT CHR$(
    229)
5090 MOVE 0,90:DRAW X*32-95,90,7:MOVE 0,
    80:DRAW X*32-95,80,7:MOVE 0,70:DRAW
     X*32-95,70,7
5100 MOVE X*32+92,90:DRAW 640,90,7:MOVE
    X*32+92,80:DRAW 640,80,7:MOVE X*32+
    92,70:DRAW 640,70,7
5110 SUB=REG-17
5120 FOR Q=1 TO SUB/8.5
5130 IF INKEY(74)<>-1 OR INKEY(8)<>-1 TH
    EN GOSUB 1850
5140 IF INKEY(75)<>-1 OR INKEY(1)<>-1 TH
    EN GOSUB 1910
5150 IF INKEY(72)<>-1 OR INKEY(0)<>-1 TH
    EN GOSUB 2670
5160 IF INKEY(73)<>-1 OR INKEY(2)<>-1 TH
    EN GOSUB 2700
5170 IF INKEY(76)<>-1 OR INKEY(9)<>-1 TH
    EN GOSUB 2730
5180 NEXT
5190 PAPER 10:PEN 5
5200 IF X<>XL THEN GOSUB 2530
5210 MOVE 0,90:DRAW X*32-95,90,10:MOVE 0
    ,80:DRAW X*32-95,80,10:MOVE 0,70:DR
    AW X*32-95,70,10
5220 MOVE X*32+92,90:DRAW 640,90,10:MOVE
     X*32+92,80:DRAW 640,80,10:MOVE X*3
    2+92,70:DRAW 640,70,10
5230 LOCATE X-2,20:PRINT " ":LOCATE X-2,
    21:PRINT " ":LOCATE X-2,22:PRINT "
    ":LOCATE X+3,20:PRINT " ":LOCATE X+
    3,21:PRINT " ":LOCATE X+3,22:PRINT
    " "
5240 X=X+(INT(RND*8)-4)
5250 IF X<4 THEN X=X+4
5260 IF X>17 THEN X=X-3
5270 NEXT
5280 GOTO 2870
5290 'THE BIG BANG THEORY
5300 FOR A=1 TO 3:PEN 7:LOCATE 9,7:PRINT
     "[][]":LOCATE 9,8:PRINT "][][":LOC
    ATE 9,7:PEN 15:PRINT "][][":LOCATE
    9,8:PRINT "[][]":NEXT
5310 FOR T=4 TO 28 STEP 0.5
5320 SOUND 1,0,1,7,,,T:SOUND 2,0,1,7,,,T
    +1:SOUND 3,0,1,7,,,T-1:NEXT
5330 FOR A=1 TO 4:PEN 7:LOCATE 9,7:PRINT
     "[][]":LOCATE 9,8:PRINT "][][":LOC
    ATE 9,7:PEN 15:PRINT "][][":LOCATE
    9,8:PRINT "[][]":NEXT
5340 LOCATE 9,7:PRINT "    ":LOCATE 9,8:
    PRINT "    "
5350 LIES=0:GOTO 2530
5360 'THIS IS PLANET EARTH----BA--BAB--A
    HH--BAA--BA--BA--BAB---AAAAAHHH  (c
    ourtesy  of Duran Duran)
5370 INK 6,2
5380 SYMBOL 232,&0,&3,&7,&F,&F,&F,&14,&1
    4
5390 SYMBOL 233,&12,&17,&8,&8,&8,&5,&3
5400 SYMBOL 234,&E0,&18,&14,&3E,&1E,&3E,
    &3E,&5
5410 SYMBOL 235,&10,&BD,&BE,&1A,&1A,&1C,
    &18,&E0
5420 PAPER 0:PEN 4:LOCATE 16,4:PRINT CHR
    $(232);CHR$(234):LOCATE 16,5:PRINT
    CHR$(233);CHR$(235);:PAPER 11
5430 MOVE 497,339:DRAW 497,326,6:PLOT 50
    0,334:PLOT 500,324:MOVE 500,330:DRA
    W 500,326:PLOT 504,322:PLOT 504,324
    :PLOT 510,344:MOVE 512,350:DRAW 512
    ,334:MOVE 516,350:DRAW 516,319:MOVE
     514,319:DRAW 514,328:MOVE 492,339:
    DRAW 492,333
5440 PLOT 508,320:MOVE 507,336:DRAW 507,
    336:MOVE 512,334:DRAW 508,334:PLOT
    492,341:MOVE 523,319:DRAW 523,328:P
    LOT 511,337
5450 PLOT 508,350:MOVE 521,348:DRAW 521,
    346:MOVE 534,328:DRAW 534,323:MOVE
    537,324:DRAW 537,334:PLOT 521,334:M
    OVE 521,336:DRAW 541,336:MOVE 542,3
    35:DRAW 542,331:PLOT 543,341:PLOT 5
    30,347
5460 PLOT 542,338:PLOT 501,349:PLOT 498,
    346:PLOT 536,347:PLOT 527,351:PLOT
    534,349:MOVE 514,353:DRAW 522,353
5470 RETURN
```



CP/M User Group



Most people who come across the CP/M user group seem to find it rather surprising that here is a group of CP/M users trying to give away as much CP/M software as they can, to as many people as possible. For some years now, we have been collecting as much public-domain software as possible from around the world into a library for distribution to group members.

The UK library is, obviously, nearest to our hearts, and is still small enough to be able to review. Someone at a recent committee meeting of the group was heard to grumble that the library stuff was always a disappointment and was never what was expected. Let us hope that the following reviews prevent this from happening.

Volume one of the library is a very mixed salad. It was put together by bullying the committee members for bits and pieces.

BANNER.ASM

This Banner program is the reworking of a hoary old classic from the early days of the Intel users group. It was originally written to provide large titles for listings in the old days of teletypes. Each character is built up from the printed character. It is fairly primitive stuff but is still a good quick way of putting a big clear title on a listing. It would be nice to rework this program to take into account all those features that appear on the £200 printers that are available nowadays with graphics modes, and redefinable linefeed increments as well as pitch. The code in this program is fundamentally sound so it would be a good project (Modified from US Vol.8. program).

CARMAINT.BAS by K. Bennett, used to keep vehicle maintenance records. It Uses CBASIC2 and enables one to keep a neat log of all those things one is supposed to do with one's car. It also produces a list of tasks if required. It would seem to be of most use to someone with several vehicles and is of minority interest. It is a good CBASIC example program for someone learning to program in it. CARMAINT.INT, the intermediate code of the program, is supplied on disk.

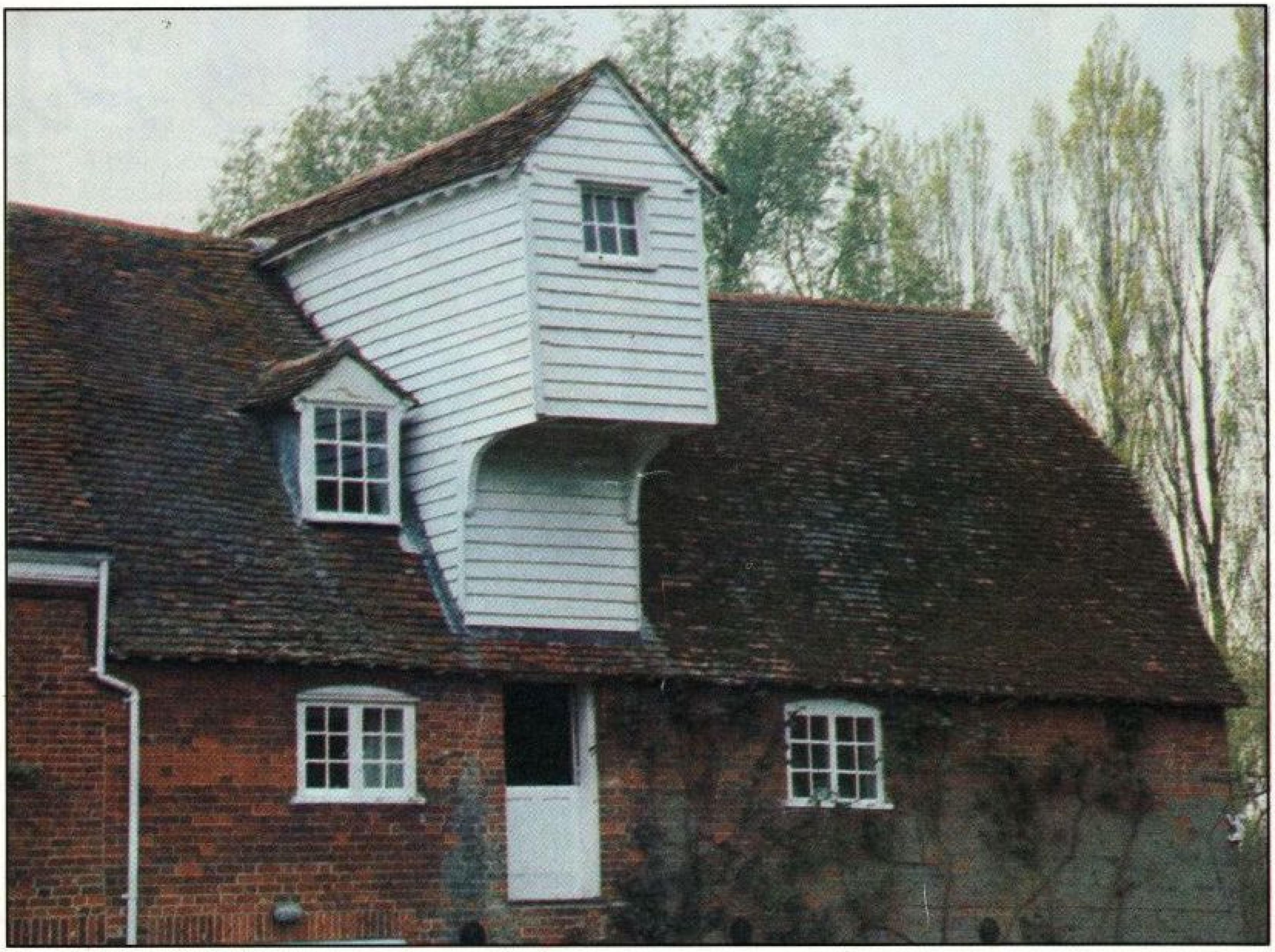
DUMBCOPY.ASM is a Single drive disk copy program. Derek Fordred and Andrew Clarke both had single drive 8" CP/M systems and needed to do sector-by-sector copying. This program is a perfectly adequate way of doing this. There is however rather a lot of disk insertion, but who cares? Derek wrote the program, using ideas from MFT.COM (on this disk), and gave Andrew a copy. Andrew made it less machine-specific. It is really only for 8" copying but is easily modified for other types of machine. Never use it as it is unless you have an 8" CP/M 1.4 or 2.2 SSSD system, otherwise it must be configured before use. It is useful to have around in case one of your disks falls off its perch and you need to do some copying.

DEDUMP.ASM is a File transfer utility from the defunct Computer Age magazine that allows Binary (eg. .COM file) transfer with some error checking. It is rather subtle in that only the receiving computer requires the software. and it is short enough to be typed in. It is therefore a good first stage in getting software onto a CP/M computer. The sending computer merely uses the DUMP.COM utility from the CP/M system disk to send the file to the serial port. The DEDUMP program sits in high memory and interprets the ASCII stream back into low memory into a memory image that then can be SAVEd. It uses no relocation as it was designed to be simply assembled by ASM.COM. Naturally, files longer than can be contained in the TPA cannot be transmitted by this means. As the program simply fills up the TPA without any disk work, it can make use of a simple serial link without handshaking, whereas a long .HEX file transferred by PIP might hit problems each time the buffer was flushed to disk, and characters lost. It is by Dr.Lee of Peterborough.

DIRDUMP.ASM is by T.Read. It produces a complete directory listing of a CP/M 2.2 disk, grouped into user partitions, directable to printer or console. This is hardly the sort of utility that one clutches wildly to one's breast but at least one can learn how to do it from the source.

DIS.COM is Uncle Davids Dynamic 8080 Disassembler. It disassembles a .COM file and produces .DIS source file. David never used any other disassembler and wrote this to

do a particular piece of "Software reverse engineering". It works quite unlike any other disassembler in that it attempts to actually work out what is executable code and what is DATA. Because it explores all the nooks and crannies of the code it will show up an area of a program that cannot ever have been executed. Unfortunately, it is about as interactive as a tornado and as friendly as a maddened buffalo. It is an excellent program when one is practiced at using it. I use it to get a first pass which I then feed into RESOURCE. It would improve the program no end if one could build up a symbol table with meaningful labels and a control table to define various types of data. David manages some very quick and skilful disassembly with this program, and it is well worth trying it out, preferably on this program. The source was not put on the disk because David wanted something for you to try the program on. He was also rather ashamed of the rather untidy source and hoped someone would disassemble and improve the program. He has now given a greatly improved version (in source) in a later volume that disassembles to Z80 mnemonics. DIS.COM is a good example of a useful tool written by someone for his own use that is then given to share with others.



HEXDUMP.ASM performs the opposite function to LOAD. It is used to create an Intel HEX file from a binary image This is useful if, for example, one wants to send a .COM file down a communication channel that accepts only ASCII data. It is modified from US Vol.40 so that it produces the correct format and can be assembled with the ASM.COM assembler. (The original source code required the TDL Assembler.) Obviously, it produces a .HEX file that can be fed into LOAD.COM DDT, SID (or HEXCOM.COM) to restore it into a .COM file. If a HEX file is sent via PIP.COM, then it is checked for any corruption. The HEX format is a good way of transmitting data down a channel that has a finite risk of errors.

HELP.MAC lists an ASCII file a screenful at a time. It is superceded by the DR HELP utility or the public domain HELP.COM in SIG/M. One types HELP XXX, where XXX is the topic that one wants help on. The default suffix is .DOC and the default filename is HELP.DOC, so one can just type HELP, and get an overview or something like that. The original idea was to provide instructions for novice users at Warwick University (hence HELP), but you must supply your own information file. CP/M users have a superior utility that, likewise, can be configured for particular purposes. JPR Palfrey, the author, thought of the idea before them and some of you may find this program useful. It requires M80, the Microsoft Macro Assembler (Z80 mnemonics).


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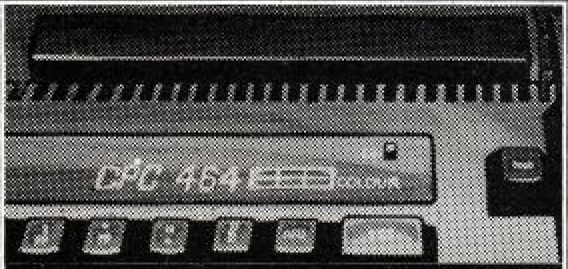
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A complete range of Rom-based programs is under development and will be released as follows:–

- Mailing-List/Club Membership; Disk User's Utilities NOW AVAILABLE.
- Programmer's Toolbox END of JULY.
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- Word Processor; Database END of AUGUST.
- Spreadsheet; Graphics/Statistics END of SEPTEMBER.

'SUPERPOWER' MAILING LIST (AND CLUB MEMBERSHIP) PROGRAM (REF A102)

The program handles very large lists of names and addresses on a selective basis, acts as a simple Database, and is particularly suitable for Club Membership records. The main features are as follows:– Each Record can contain up to 19 fields, those to appear on labels being user- selected. Variable length fields are used to optimise memory and disk space.

In practice, approximately 2000 records containing name and address and two non-label fields can be held on one side of a disk. Multiple double-sided disks are catered for. Each record can have up to 20 classification indicators.

When used as Membership List, 12 can be nominated for monthly subscription reminders.

A screen report gives breakdown by categories. Printing options include Label fields only, and Total Record including classifications. Label can be of two standard sizes or user-defined.

Program works with any parallel printer. Alphabetical Order is dealt with Entry. User choice of keyword. e.g. 'J'ohn or 'S'mith. The Name field can be searched for the first part or the whole of a keyword. The whole file can also be searched for any string. There is sophisticated line and character editing, including change of keyword. Function Keys can be defined to give single key entry of commonly used string e.g. 'Membership No.' In Entry mode an automatically incrementing number is available. Foreground and Background colours can be selected.

'SUPERPOWER' DISK USER'S UTILITIES ROM (REF A103)

This program allows detailed inspection and modification of information held on disk. It is of particular use in the recovery of data from corrupted disks. Individual sectors can be read from and written to. All data can be output to the screen and/or printer.

The program also contains functions of use to the assembly language programmer.

Main Functions

- FILELOADS–loads first sector into buffer and remainder into memory for fast access later.
- READ–reads a sector into the buffer and enters Edit Mode.
- EDIT–displays the current buffer. Data displayed is Buffer Address, Hexadecimal representation of each byte and ASCII representation of each byte.

Depending on mode selected, display is of 12 or 24 lines of 8 or 16 bytes.

– modification of Hex numbers, changing the ASCII automatically and vice versa.
– comprehensive cursor controls for easy editing.

- FIND–can search a sector or total file for an ASCII string.
- WRITE–writes a sector previously read by READ or FILELOAD.

Subsidiary Functions

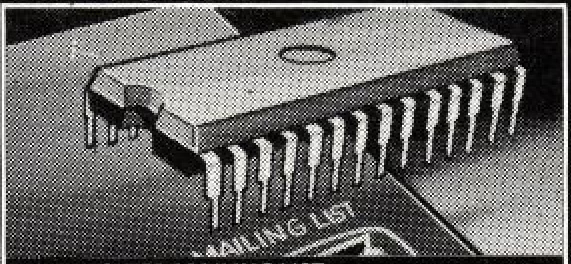
- CATALOGUE–similar to AMSDOS catalogue.
- MODE–Select 40 col./12 line display or 10/12, 40/24 or 80/24.
- INK–Select Background and Foreground Colours.
- ROM CHECK–lists all sideways Roms, giving Position, Foreground or Background, Name Version No. etc.

Other Disk Commands

Access to other commands such as Format and Verify is provided directly from the Rom.

ASSEMBLY PROGRAMMER'S AIDS

Disassembler. Relative Jump Calculator. Calculate the Sum and Difference of two hex numbers. Hex to Decimal Conversions–and vice versa. Intelligent Copy.



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SUPERPOWER ASSEMBLER, DISASSEMBLER & MACHINE-CODE MONITER (Ref A 105)	£39.95

'SUPERPOWER' PROGRAMMER'S TOOLBOX (REF A104)

This program provides a treasure chest of additional BASIC commands and functions, some of which are effectively provided in the CPC 664, as well as a large number of Programmer's Aids.

ADDITIONAL BASIC

- TURTLE–provides 'logo-like' turtle graphics when suffixed by a string of data in specified format.
- TUNE–plays music when suffixed by a string of data in specified format.
- CIRCLE–draws a circle from specified centre co-ordinates and radius.
- FILL–starting from a point, will fill an area surround by the foreground colour.
- GCOL–permits AND, OR and XOR with existing colours. (Simulates extra parameter of 664 graphics command).
- GRAPHICS PEN/GRAPHICS PAPER–select colour of graphics and background.
- COPYCHR–reads a screen character.
- ECHO ON/ECHO OFF–switches printer output on and off.
- PAGE ON/PAGE OFF–switches paged screen output on and off.
- CLEAR INPUT–clears input buffer.

PROGRAMMER'S AIDS

- EDITOR–provides 2 additional windows for the examination and editing of a Basic program.
- FIND «and REPLACE»–finds all occurrences of a string and optionally replaces with another string.
- XREF–lists all line nos. containing a particular line reference no. (GOTO'S, GOSUB'S etc.)
- COMPACT–removes lines starting with REM statements.
- FRAME–synchronises screen update with frame fly-back.
- PRINTER–selects Epson-compatible or Amstrad printer for dump routines.
- FDUMP–fast two-tone screen dump, with user-definition of colours to be treated as 'pen' and 'paper.'
- CDUMP–shaded screen dump depicting up to 9 colours.
- PLOAD–loads program saved under 'P' option.
- INFO–gives details on a specified disk file.
- MEDIT–comprehensive memory editor, displaying HEX and ASCII and enabling examinations of ROMS and RAM and also RAM modification.
- HELP–lists all commands and functions, together with their parameters.

In addition there are routines to design and generate characters, to convert screen characters into data for insertion into a Basic line and for defining a 'Mask' for the drawing of lines.

The program will be available in late July.

'SUPERPOWER' ASSEMBLER, DISASSEMBLER & MACHINE-CODE MONITOR (REF A105)

This suite of routines represents the complete Development Package for the Amstrad Z8Ø programmer. The assembler has a sophisticated text editor, a comprehensive set of options, is very fast and incorporates special techniques enabling large source files to be handled in memory. The full-feature disassembler produces files which can be edited and then re-assembled.

The Machine-code Monitor routines are extremely powerful, including the setting of conditional breakpoints (including loop counter option), single-step execution, alternative five column binary and mnemonic formats. Both sets of Z8Ø registers can be displayed. Other options include Intelligent Move, Modification of code to run at a new address and colour selection of border, paper and pen.

The program will be available in early August.

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ROM-BASED SOFTWARE FULFILS THE PROMISE OF YOUR

SUBMIT TO CP/M

David Link-Hisoft

On your CP/M system disc there are many useful utility programs which are not fully documented in the current manuals for the 664 or 464 disc system. Among these utilities is SUBMIT.COM. The purpose of this article is to give you some help in using this program.

What is Submit?

SUBMIT is a standard CP/M utility supplied with all CP/M-80 systems which allows you execute a series of programs, one after the other, automatically.

Why use Submit?

When starting a session on disc-based computer it is wise to make sure that you have a new disc for the work ahead. This would probably involve, formatting the new disc; copying the CP/M system tracks to the disc using SYSGEN.COM and copying each of the various utilities (e.g. PIP, STAT etc.) to the disc.

Running all the programs to do this is obviously quite a tedious task. SUBMIT, however, allows you to put all the operations neatly together in one file, perhaps named NEWDISC.SUB and then all you have to do to create your new disc is issue the command.

Submit NEWDISC

Of course, you will still need to answer all the questions that FORMAT, SYSGEN and FILE COPY ask you but this is much easier than invoking each step yourself, after all, you might forget to copy one of the utilities. Other times when you might use SUBMIT are:

- backing up only part of a disc;
- compiling/assembling a series of programs and
- printing a number of documents, succesively.

How do I use Submit?

I'll take the example which I used above of making a new work disc and assume that you are going to use the disc for writing Pascal programs. You will, therefore, need files like STAT.COM, PIP.COM, ED-80.COM (an editor) and HP80.COM (a Pascal compiler) on your disc. What we are trying to achieve then, is to create a file containing a sequence of commands that will format the new disc, copy the system tracks onto it and then copy the above utilities onto the new disc. This file must have a file extension (file type), of .SUB so that SUBMIT will recognise it. To create the file, we can use ED.COM which is a line editor supplied on your CP/M disc and proceed as follows (prompts are shown in bold type, don't type these):

```
A>ED PASCAL.SUB <ENTER>
NEW FILE
    : *I <ENTER)
   1: FORMAT <ENTER>
   2: SYSGEN <ENTER>
   3: FILECOPY STAT.COM <ENTER>
   4: FILECOPY PIP.COM <ENTER>
   5: FILECOPY ??80.COM <ENTER>
   6: <CTRL/Z>
    : *E <ENTER>
A>
```

You have now created the file PASCAL.SUB on your current disc. To execute the file simply type:

```
A>SUBMIT PASCAL <ENTER>
```

This will execute the commands in order and you will be asked the normal questions by FORMAT, SYSGEN and FILECOPY; this will involve changing discs.

You can add flexibility by using parameters in the submit file. Try the following; using ED again or any other editor. There are certainly many better editors available under CP/M:

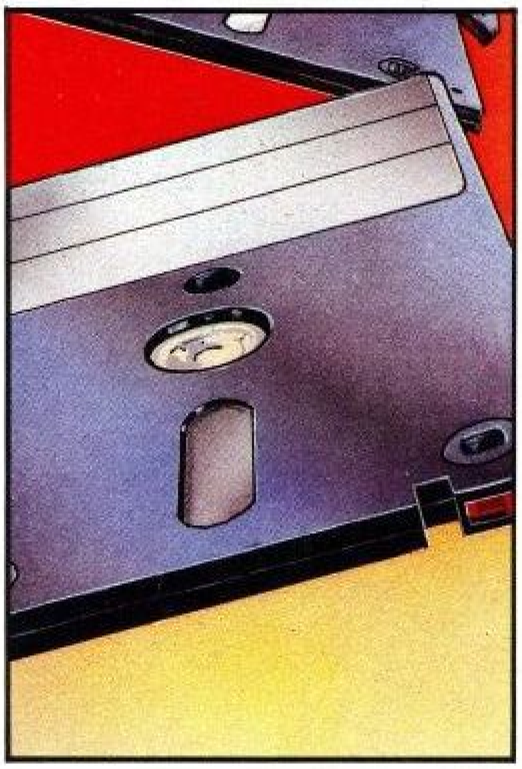
```
A>ED NEWDISC.SUB <ENDTER>
NEW FILE
    : *I <ENTER>
   1: FORMAT <ENTER>
   2: SYSGEN <ENTER>
   3: FILECOPY STAT.COM <ENTER>
   4: FILECOPY PIP.COM <ENTER>
   5: FILECOPY $1 <ENTER>
   6: <CTRL/Z>
    : *E <ENTER>
A>
```

Now, when you submit this file you may include a parameter at the end of the line and this will be substituted for the $1 in line 5 above, enabling you to specify a file (or many files, using ambiguous filenames) to be copied, on the command line e.g.

```
A>SUBMIT NEWDISC ED.COM <ENTER>
```

will format, sysgen, copy PIP and STAT and then ED onto your new disc.

You can have up to 10 parameters ($0 - $9) but any expanded command line must not be larger than 125 characters. If you want a $ sign within the text of your SUB file then



you must use $$ for each $ required. If you want control characters within the file you should use up-arrow (↑) followed by a letter e.g. ↑C for <CTRL/C>. Be careful not to include any blank lines within your submit file, they are not tolerated by SUBMIT.

You can abort the operation of SUBMIT when it is processing a command by pressing <DEL> or <CTRL/C>.

Finally, a technical note on the working of SUBMIT. When you type SUBMIT ANYTHING <ENTER> then SUBMIT does any parameter substitution necessary; produces a file called $$$.SUB on the current drive (which is ANYTHING.SUB with parameters substituted) and then does a warm boot into the CCP. The CCP then looks for a $$$.SUB file on DRIVE A and if it finds this file, it then stores the first line of the file, deletes this line and makes a new copy of $$$.SUB with the first line missing. When the execution of the first line finishes, it will do a warm boot into the CCP which will go through the above sequence again, creating a new $$$.SUB file with the first line deleted. This carries on until there are no lines left at which point SUBMIT finishes. The upshot of all this is that, if you want SUBMIT to take effect immediately then you must be logged-in to drive A. If you are logged into another drive then the $$$.SUB file will be created but not executed until the disc is logged-in to drive A.

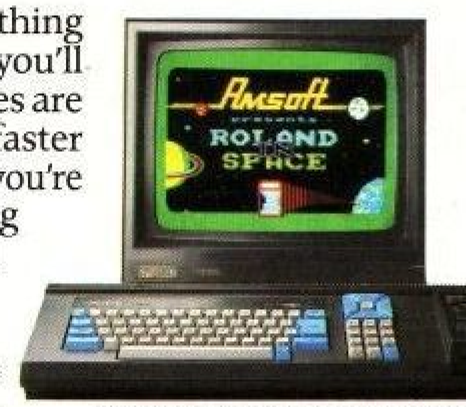
I hope that last paragraph didn't put you off too much, SUBMIT is a very useful utility that eases many routine tasks under CP/M.

ACU

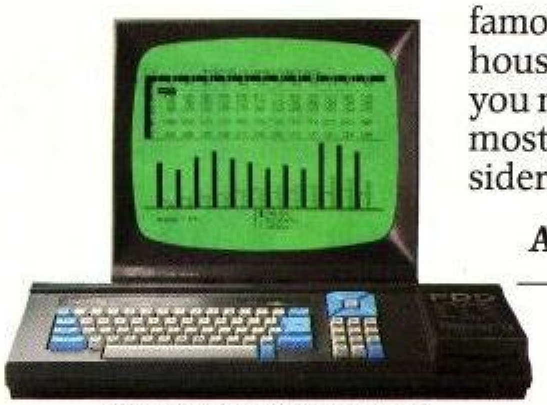
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BUSINESS OR · PLEASURE ·

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

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Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

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The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.



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With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

AN EXPANDING · SYSTEM ·

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

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Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details will be recorded on your personal club card, which entitles members to various privileges and offers.

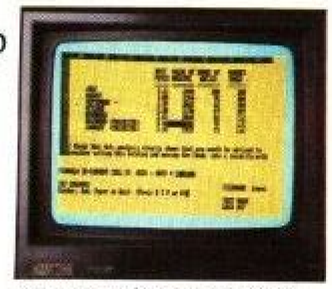


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MASTER-CALC: A PREVIEW

The author of master-calc explains the virtues of his program and shows us how useful it can be

By John A Campbell

Introducing the spread-sheet...

One of the most useful computer applications is the electronic spread-sheet in which numeric information can be arranged into an array, and further numeric data can be computed, such as totals, averages, percentages, and other mathematical relationships. The computerised process guarantees correctness, and removes the drudgery of recalculation when source values are changed. Thus the spread-sheet is today finding new uses in planning, forecasting, and performing 'what if?' simulations.

Just about every kind of business or process can be represented using a spread-sheet, and the advent of the personal computer has put this most useful class of tool within every business user's reach. The analysis of business performance against time is a classic application, but there are many others, e.g. balance sheets, engineering costing, home budgeting, cash flow, sales commission.

MASTER-CALC is a new spread-sheet program for the CPC464 computer, from the same stable as MASTERFILE 464, and is to be published by AMSOFT. The most important features are now described.

The program is entirely machine coded for speed and compactness, leaving an unusually large capacity for the main array - up to 3000 cells. For example, it will accommodate a 120 x 25 array. The same program runs either from tape or from disc via AMSDOS (Thank you Arnold, for the superb firmware design).

Choose your Widths...

Each cell can hold a numeric value up to 9,999,999,999,999,999 and can show up to seven decimal places. Thousands commas are optional. Each column displayed can be tailored in respect of screen width (4 to 24 characters), decimal places, and commas. For example, you can make wider columns for labels and totals, and show percentages to three places, money to two places, and other data as integer.

Naturally, you can alter widths and format at any time, and even insert new rows or columns, without loss of data.

Text can be keyed into any cell or row directly (although there is protection against accidental overwriting of data). Entry of numeric values is very direct, and values are stored at the highest precision irrespective of their display format.

For example, enter 1.53 into an integer cell, and it will display as 2. However, if you later alter the format to two decimal places, the original value of 1.53 will be displayed.

What a mover...

The cursor can auto-advance either down or across after data is entered.

All spread-sheets offer cursor movement, and window movement. But MASTER-CALC goes further, allowing two independent windows, together with column overlay - like folding the plan along a vertical crease. 80-column mode is most useful, but you can also flip into 40-column mode.

Portable Formulae...

We think we have broken new ground with MASTER-CALC formula processing. No longer does one key-in a formula at a cell; instead one keys-in a formula in a 'portable' form, then state which cells are to use it. A unique element of a formula is the use of one row or column reference without the other. A formula completes a cell reference by taking the column or row where it is used. Confused? You might be if you have used a conventional spread-sheet - but we think our method is more powerful, and easier to use once the principle is understood. An example of a portable formula is:

```
C9*100/C11
```

...which means 'Column 9 as a percentage of column 11 in whatever row this formula is used'.

MASTER-CALC allows up to 99 formulae, each up to 75 characters, each allowing an expression cell reference, constants, and the operators "-*/. There is conventional operators' precedence, and brackets can be used to alter or clarify precedence. There are no advanced maths' functions just yet.

Whilst one can code a formula to compute a total, there is no need to, since totals and sub-totals by row or column can be generated directly. There is also a

direct way to generate a cumulative total along a row or column (i.e. the sum of the cell to the left and the cell above).

Computing...

Recalculation of totals and formula cells is done on demand. However, MASTER-CALC seldom keeps you waiting for more than a second or two, even though all the work is done in eight-byte floating point.

When you view the spread sheet, all you usually see are numbers and text. But by pressing a key you can instantly highlight those cells in the window which are computed, and how!

A Picture is Worth...

By pressing as few as four keys, data in the window can be transformed into a histogram, showing from one to three rows. Scaling is automatic, and negative data is allowed (causing the base-line to rise). Another feature unique to MASTER-CALC is that the histogram horizontal scale is synchronised to the current column widths - thus the column headings retained in the upper half of the screen serve to label the histogram in the lower half.

If your printer is Epson-compatible in respect of graphics mode, then you can also get an exact screen copy - particularly useful for the histogram.

Normal printed copy of the spread-sheet is available with or without the column and row numbers, and you can feed control characters to your printer in order to, for example, switch to condensed mode printing.

Save It...

A spread-sheet can be saved to disc or tape, and reloaded later. CAT is also offered in case you have forgotten the save name. We have made it all as friendly as possible - even down to offering a colour tuning aid, and a pop-up menu to save you reaching for the manual - (with over 50 functions, we don't expect you to memorise them all at once).

ACU

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Printers – all Epson (e.g. RX80 F/T £289.00); Canon PW1080A (160cps + NLQ) £368.00; Juki 6100 Daisywheel £429.00; Amstrad DM1 £199.00 etc.
Miscellaneous: 3" Diskettes £4.95; Printer Lead £9.95; Joysticks from £9.95; TV Modulator £29.95; Dust Covers – Keyboard £3.25, Monitor £4.50; Games Software from £2.50.

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The DARK Side

In every publication there lurks a desire to give vent to ideas and feelings that do not fit comfortably under the headings of news, features, reviews, etc. Amstrad Computer User opens this month's box of delights....

Paying the price of power

Everyone shouted hooray when the 48K Spectrum appeared. But software houses had to spend around 3 times as long developing Spectrum software since they felt obliged to fill all those new bytes with lovingly crafted object code. Software houses didn't get 3 times as much for the programs though, did they?

Now the hype is out for 256K and 512K machines. Who will bid ·100 for this 512K version of Jet Set Willy. It took 3 years and 10 programmers to complete with over 2000 rooms.

OK, so most 16 bit operating systems mop up around 64K before they have put up the wake-up message, and since the memory is available with relative ease, early 16 bit micros do not seem to use it too cleverly and so manage to perform more slowly than their 8 bit counterparts.

In the world of ever escalating hardware capabilities, those who pay the price are going to be the software houses who invest man years in a program that doesn't quite make it. On a 16K Spectrum a failure was maybe a month's work down the drain. On the 512K Super Whizzo, it's probably, the house, the car, and the shirt off the proprietor's back.

It will be interesting to see just how enthusiastic nervous software houses are going to be when weighing up the benefits of launching 5 programs on an established user base, or gambling one program on a new Super Whizzo.

Disc dilemma

In launching the CPC664, Amstrad have started the inexorable process of putting the cassette out of its misery. The debate about whether or not a 3 inch or 3.5 inch disc is the 'thing' will rage a while - but at the end of the day, it seems likely that both will survive since there isn't much evidence that 3.5 inch drive manufacturers are going to follow the lead of the 3 inch manufacturers and price to kill.

While the 3.5 inch drives are selling in good numbers and attracting around twice the price of the 3 inch drives from manufacturers like IBM, it seems unlikely that anyone is going to want to halve their margins on prime product to pander to the fickle consumer end of the business.

By taking the 3 inch drive by the scruff of the neck, Amstrad was able to assure the few manufacturers of drives and media of a nice 'tight' marketplace. I would use the term 'monopoly' with caution - since the floppy disc market is anything but a monopoly. What Amstrad has done is instill confidence in the 3 inch format and in so doing, brought the price of disc based computing down to a very affordable level.

Remember that you can always tack a 'standard' 5.25 or even 3.5 onto the Amstrad disc controller.

Caveat Azimuth Adjustor

There's no denying that cassette mechanisms can get out of alignment and that the heads can get dirty. The first problem (azimuth alignment) is not for the unwary, since it involves an intricate setting of the angle at which the record/playback head addresses the tape. The second problem tends to be curable by use of one of the many proprietory cleaning tape systems.

Nevertheless, there are a couple of azimuth adjuster tapes on the market, so it must be said that the use of these in unskilled hands will not only invalidate the guarantee on the equipment (there's a seal on the adjusting screw that is broken if you twiddle it), but can do more harm than good.

If you can't read commercial high speed tapes recorded at 2k baud or more even after a good clean-up, then get a qualified service centre to give the cassette unit a service. Only the really daring and experienced should attempt to adjust the azimuth on a tape head.

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Amstrad CPC464 Speech Synthesizer

The dk'tronics Amstrad speech synthesizer and powerful stereo amplifier uses the popular SLO/256 speech chip and has an almost infinite vocabulary. It is supplied with a text to speech converter for ease of speech output creation. Everything you wish to be spoken is entered in normal English, without special control codes or characters, it is therefore extremely easy to use. The voicing of the words is completely user transparent and the computer can carry on its normal running of a program while the speech chip is talking. The speech output from SLO/256 is mono and directed to both speakers.



Stereo Output

To utilise the Amstrad stereo output on the back of the computer, the interface has a built in stereo amplifier, this gives all sound output a totally new dimension and greatly improves the sound quality and volume over the computer's internal speaker. Any sound that previously came out of the mono speaker will now be sent out via the interface in stereo. All programs that use the sound in anyway (i.e. commercial software) will now output through the interface, which is fitted with volume and balance controls.

Speech Synthesis

The Amstrad speech synthesis utilises parts of the spoken word known as allophones. These are actual sounds that go to make up speech. The SP0256 allophone speech synthesis technique provides the ability to synthesize an almost unlimited vocabulary. Fifty-nine discrete speech sounds (allophones) and five pauses are stored in the speech chip's internal rom.

Text to Speech

Although there are only 26 letters in the alphabet, letters have a totally different sound when used in different words. For example, The ''a'' in 'Hay' is much longer and softer than in 'Hat'. When you speak you automatically make adjustments because you know just how a word should sound Not quite so easy with a computer.

The machine code software is mainly developed to this mode of operation. 3.5K is used for tables which contain the rules & exceptions to the rules of the English Language.

e.g. I before E except after C) This therefore allows the user to enter words to be spoken in normal English.

Speakers

Supplied with the Speech Synthesizer are two high quality 4″ speakers these have been designed to compliment the Amstrad Computer. They are fitted with 1 metre of cable and can be positioned for the best stereo effect. The synthesizer interface fits neatly on to the rear of the computer. It has a through connector to enable other interfaces (e.g. Disc Drive) to connect to the rear of the synthesizer for ease of expansion Please send S.A.E. for a copy of the instruction manual which will give full and comprehensive details.

New Basic Commands

There are 8 new Basic Commands which control all the functions of the interface. Making the Synthesizer very easy to use. You can even control the speed at which it will talk to you. Or use the synthesizer to create sound effects like a fourth sound channel.

10 PRINT '' 'AMSTRAD' ''

The above is an example of the Syntax for entering speech into the computer and shows how simple it is to use.

The instruction book gives comprehensive details and examples of how to use the interface both from machine code and basic.

How to Order

The Amstrad Speech Synthesizer costs only £39.95. You can obtain your synthesizer through any good computer store or by completing the order form and returning it to:
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